US009233322B1

(12) **United States Patent**
Huda et al.

(10) **Patent No.: US 9,233,322 B1**
(45) **Date of Patent: *Jan. 12, 2016**

(54) **PUSH FILTER WITH FLOATING KEY LOCK**

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(73) Assignee: **KX Technologies LLC**, West Haven, CT (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 296 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **14/053,086**

(22) Filed: **Oct. 14, 2013**

Related U.S. Application Data

(63) Continuation-in-part of application No. 13/645,726, filed on Oct. 5, 2012, now Pat. No. 8,673,146, which is a continuation of application No. 13/396,316, filed on Feb. 14, 2012, now Pat. No. 8,366,930, which is a continuation of application No. 12/188,816, filed on Aug. 8, 2008, now Pat. No. 8,137,551.

(51) **Int. Cl.**
B01D 29/96 (2006.01)
B01D 35/30 (2006.01)

(52) **U.S. Cl.**
CPC ***B01D 29/96*** (2013.01); ***B01D 35/306*** (2013.01); *B01D 2201/301* (2013.01); *B01D 2201/305* (2013.01); *B01D 2201/4053* (2013.01); *B01D 2201/4061* (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

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Primary Examiner — Benjamin Kurtz
(74) *Attorney, Agent, or Firm* — Robert Curcio; DeLio, Peterson & Curcio, LLC

(57) **ABSTRACT**

A filter assembly for fluid filtration having a push-activated lock and release mechanism. A push filter design activates a floating key lock upon insertion and extraction, where the filter key may be used simultaneously as a lock and as an identifier for particular filter attributes. The filter base may be situated inline, and in fluid communication, with influent and effluent piping, such as within a refrigerator. The filter housing assembly may be attached to, and removed from, the filter base by a push-actuated release. Upon insertion, the filter key shifts the filter lock longitudinally to receive interlocking segments. Upon extraction, the same axial push shifts the filter lock further to align the interlocking fingers within gaps that allow for easy extraction. The specific key lock design allows a user to identify and match certain filter configurations received by the mechanical support, and reject other filter configurations.

23 Claims, 18 Drawing Sheets

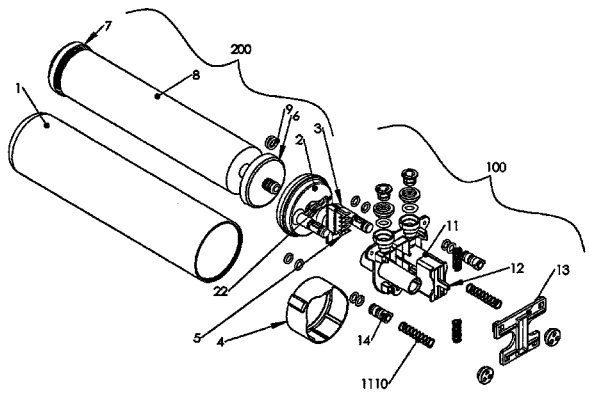

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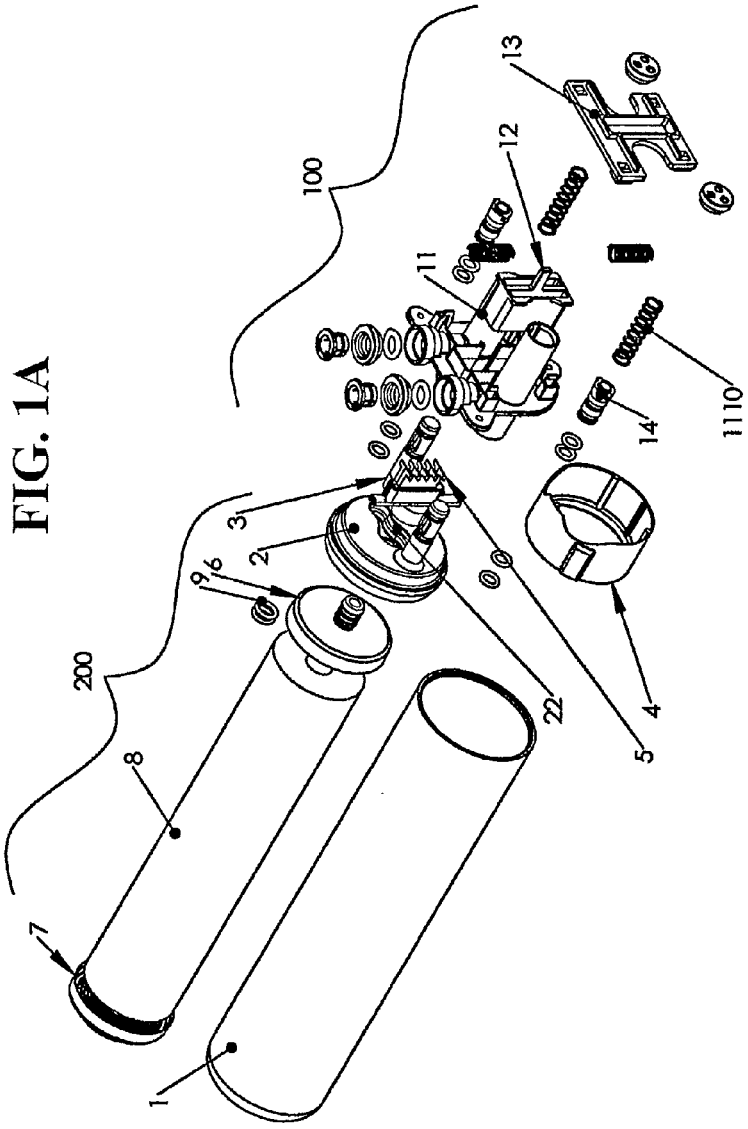
FIG. 1A



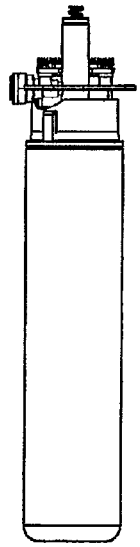
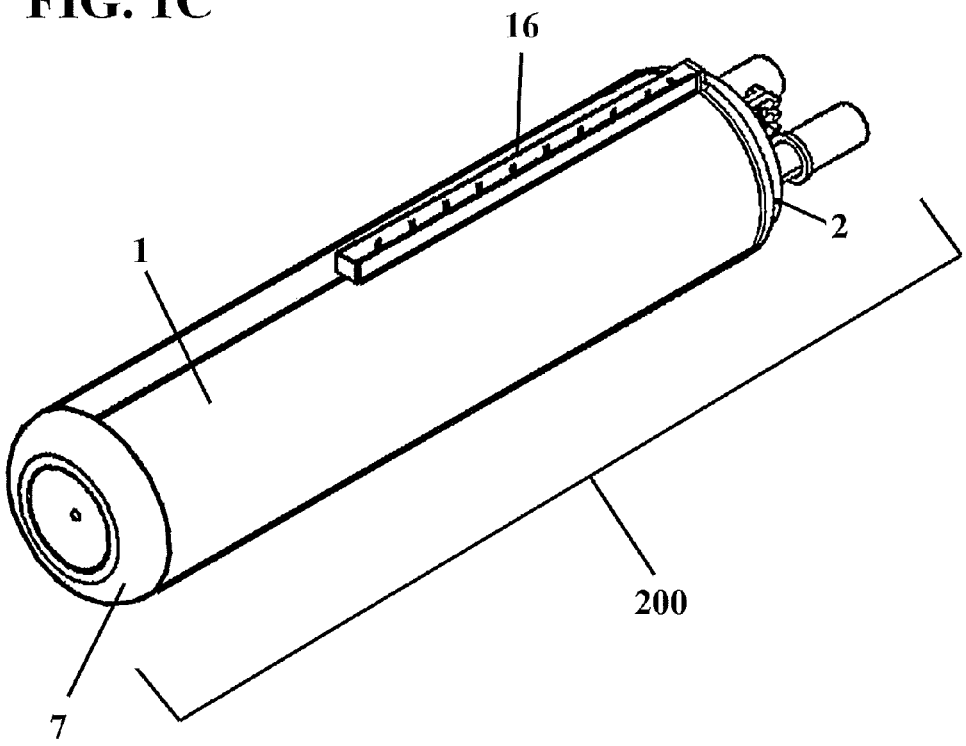


FIG. 1B

FIG. 1C



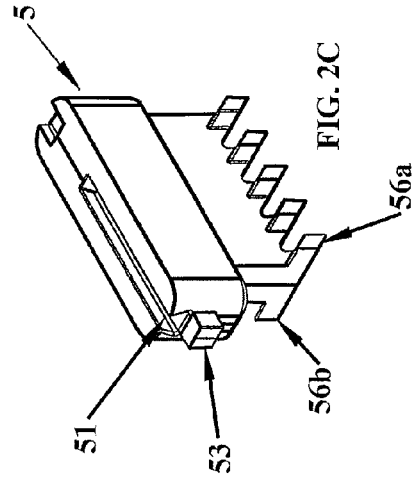


FIG. 2C

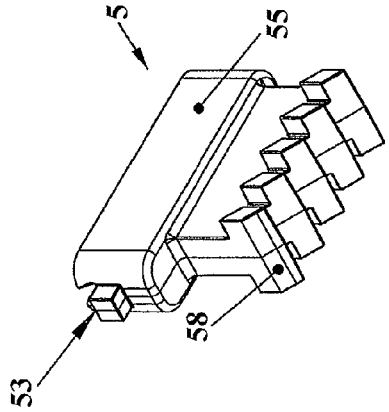


FIG. 2A

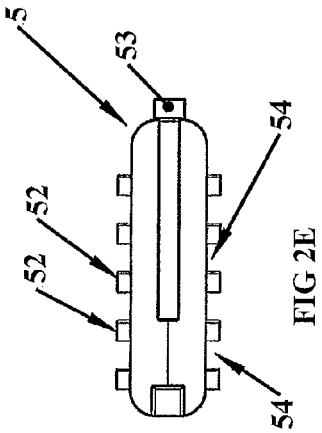


FIG 2E

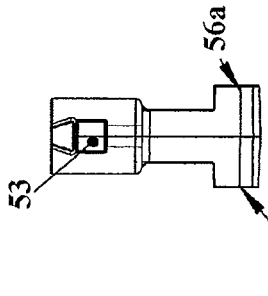
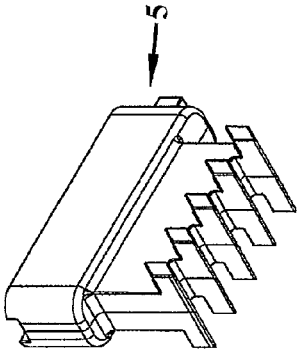


FIG. 2B



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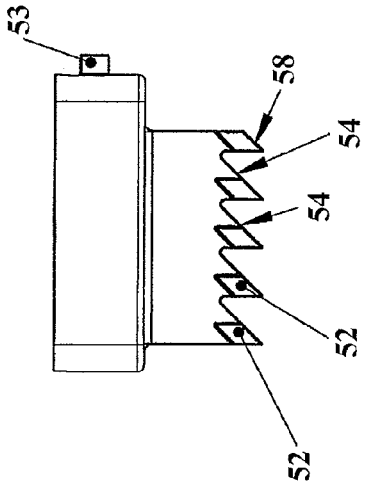


FIG. 2F

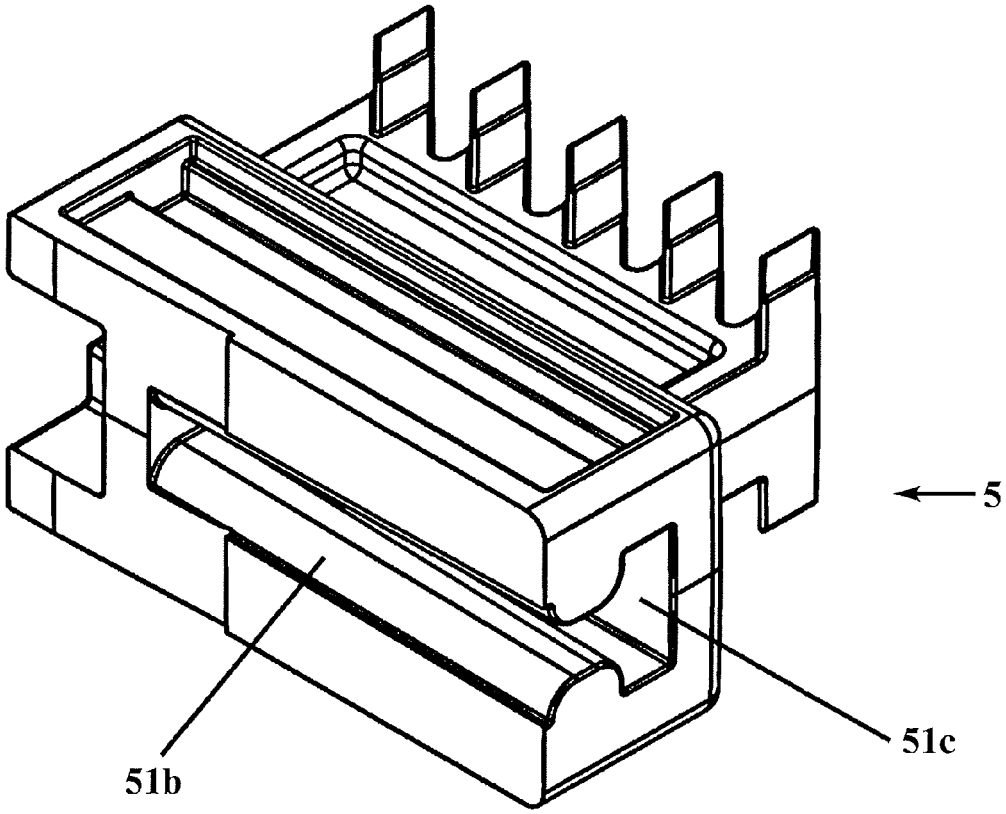


FIG. 2G

FIG. 2H

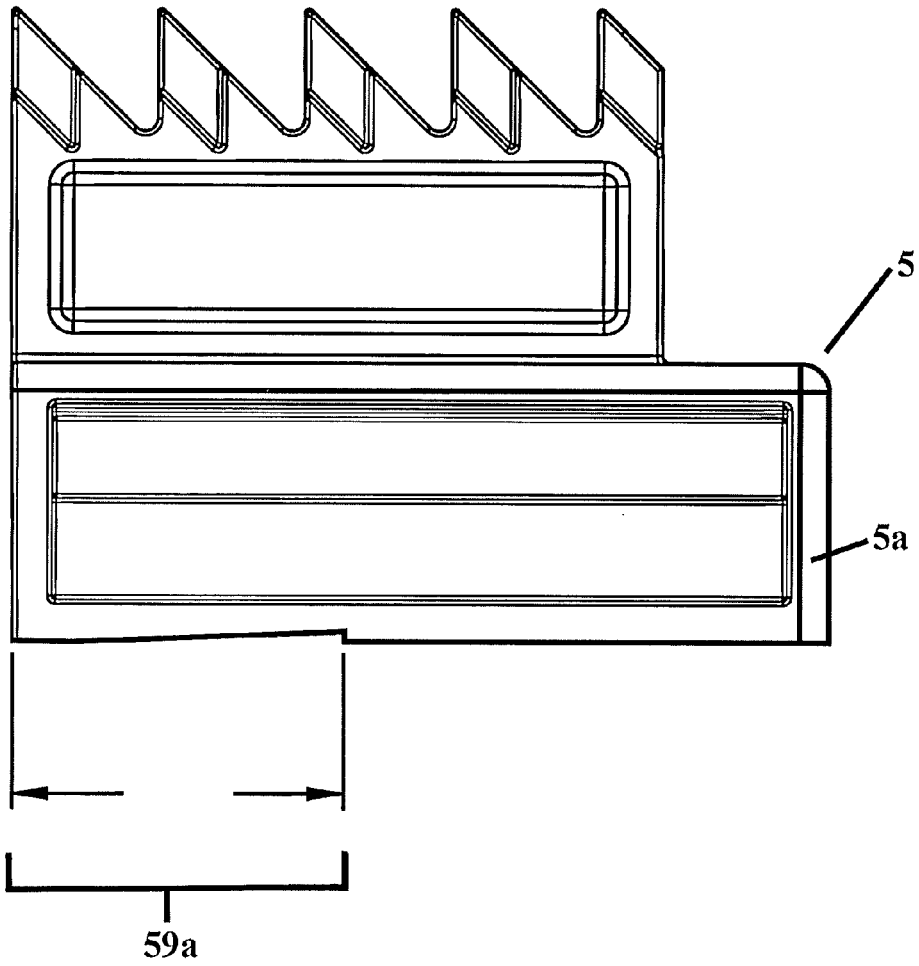


FIG. 2I

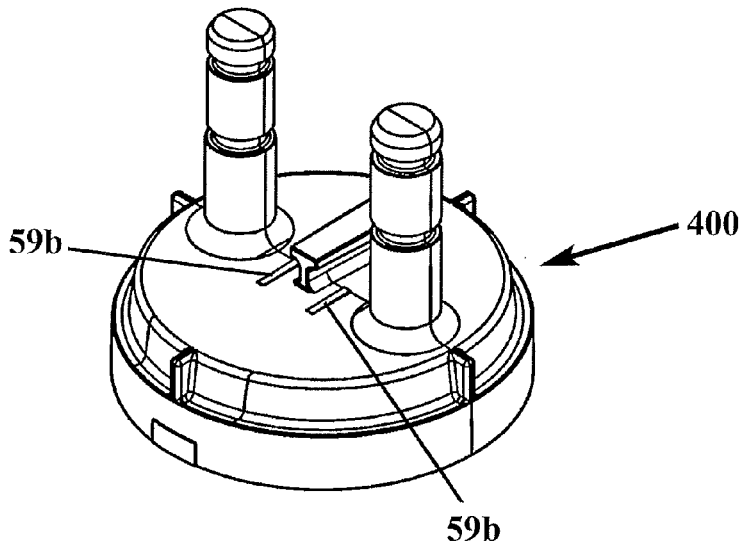
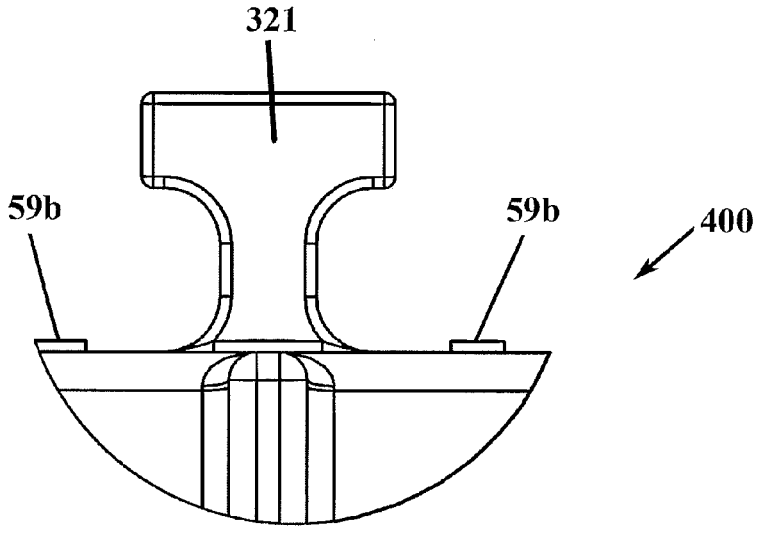


FIG. 2J



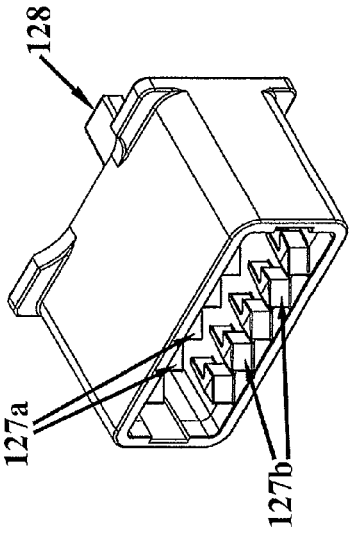


FIG. 3A

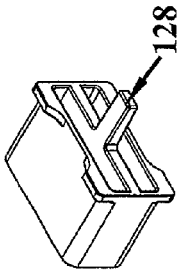


FIG. 3B

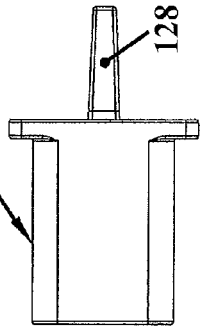


FIG. 3C

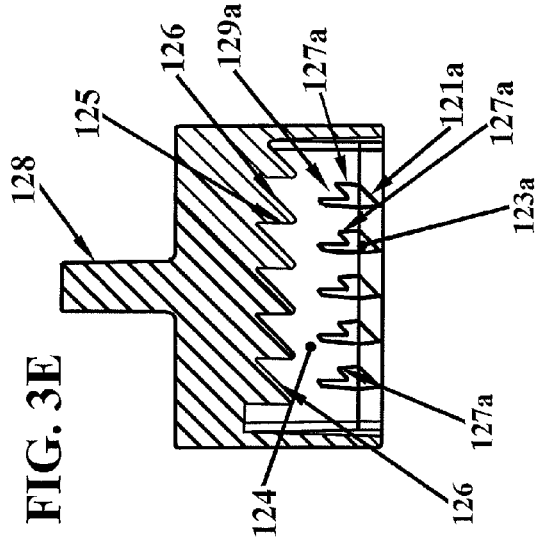


FIG. 3E

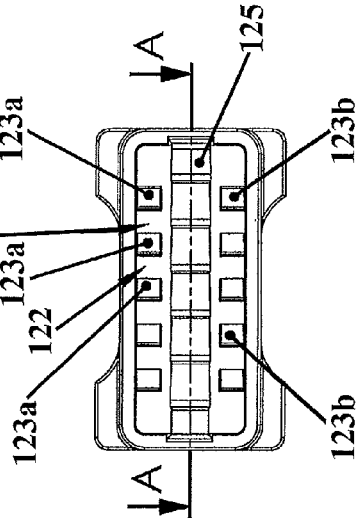


FIG. 3D

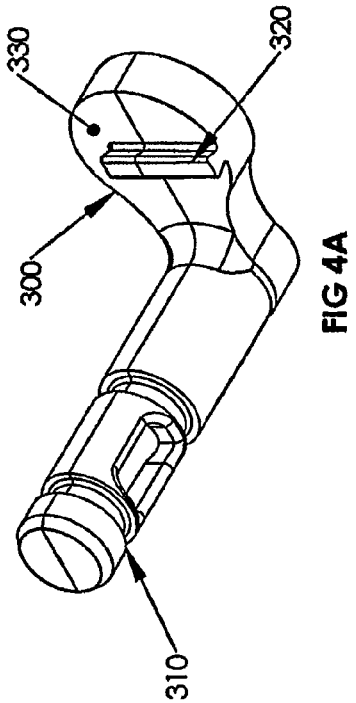
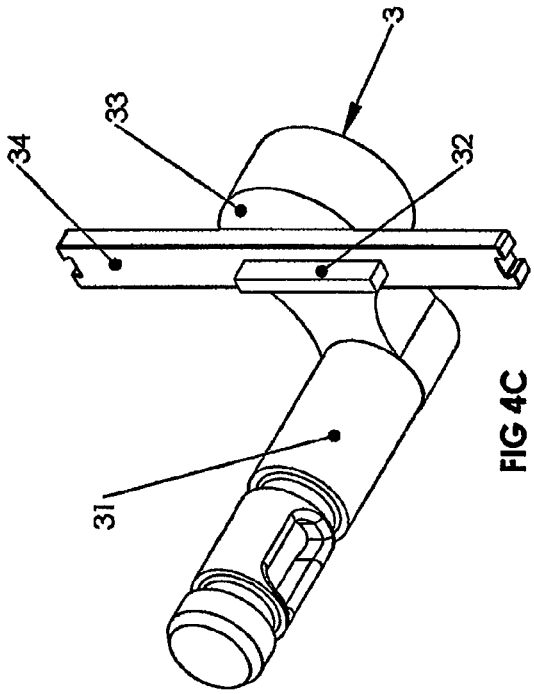


FIG 4A



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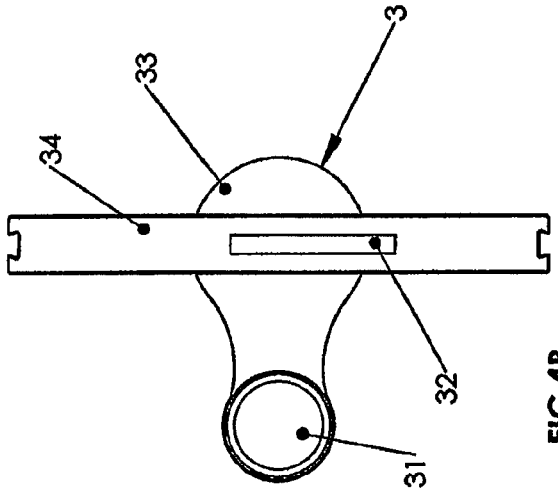


FIG 4B

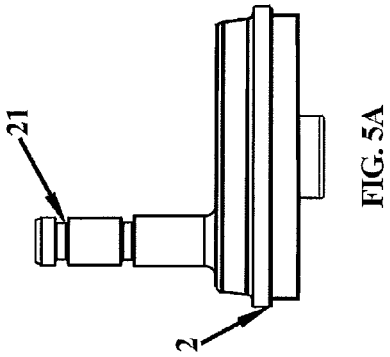


FIG. 5A

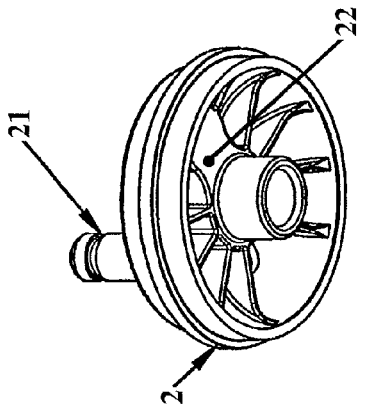


FIG. 5B

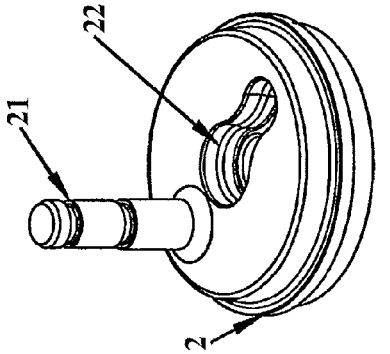


FIG. 5C

FIG. 5D

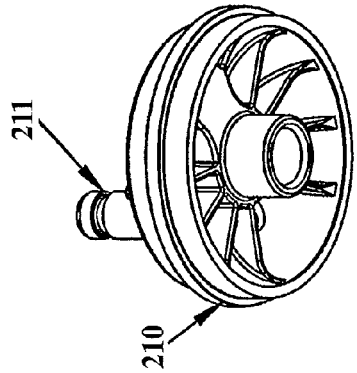


FIG. 5E

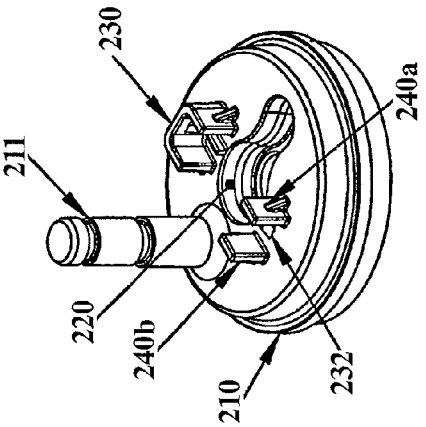


FIG. 5F

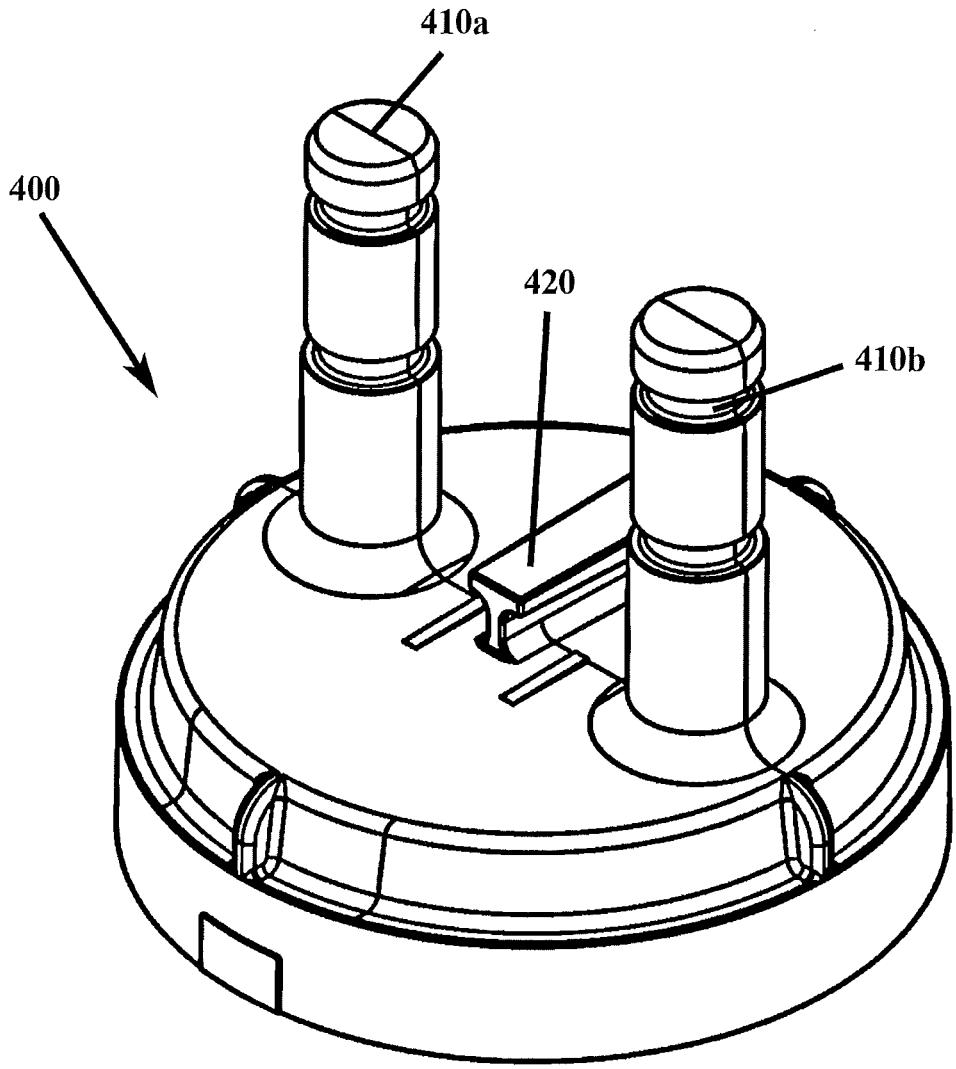


FIG. 5G

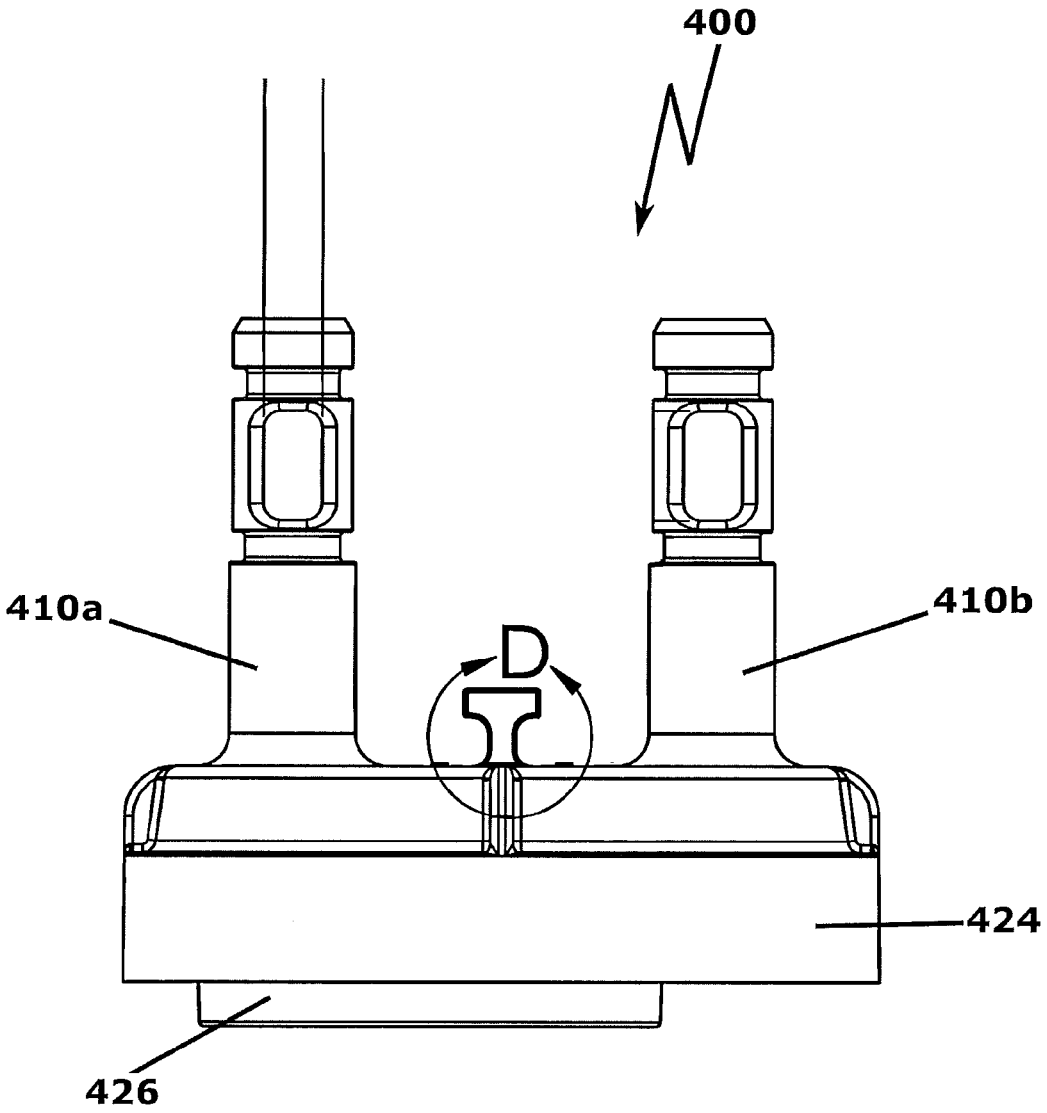


FIG. 5H

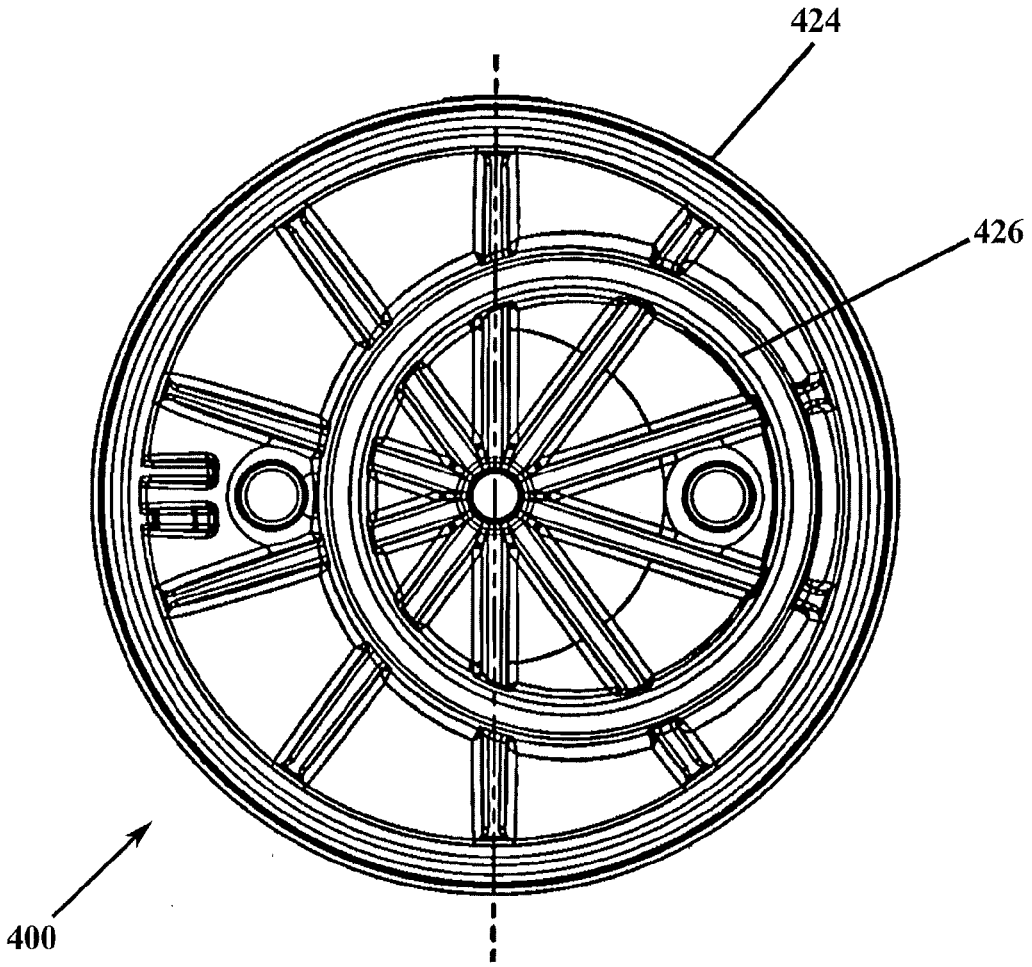
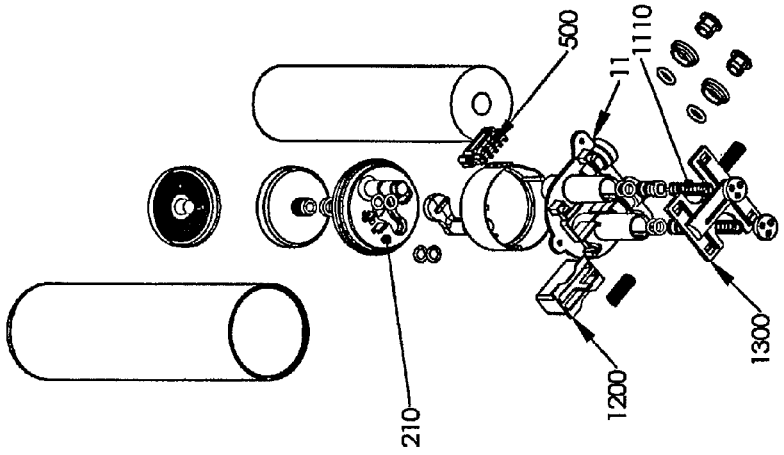


FIG. 5I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1300
1200
210

FIG. 6B

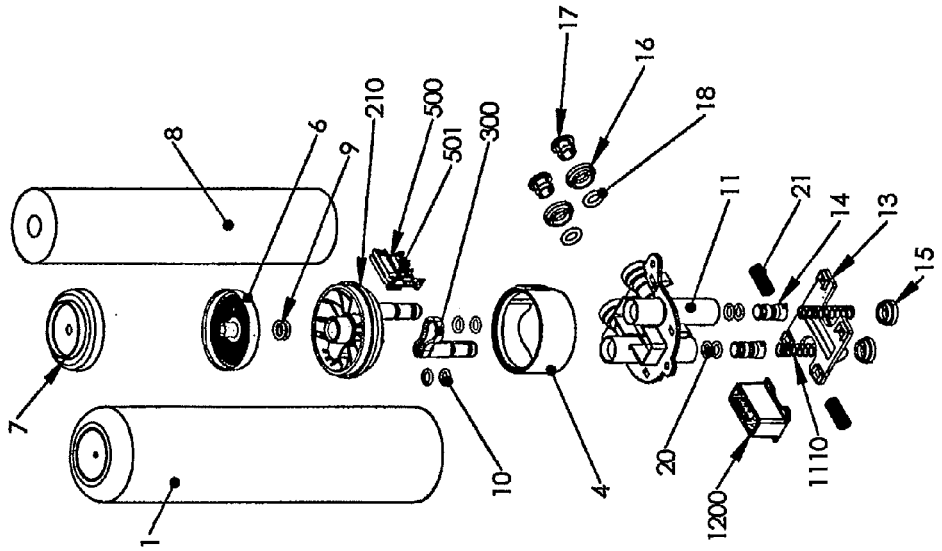
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FIG. 6A

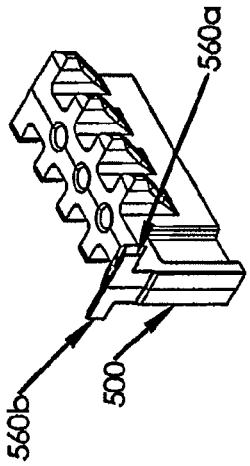


FIG 7A

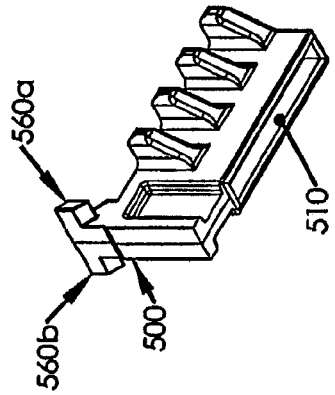


FIG 7B

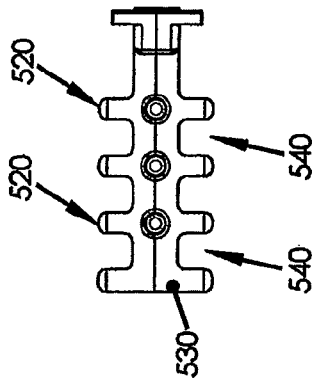


FIG 7C

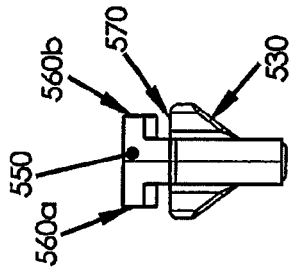


FIG 7E

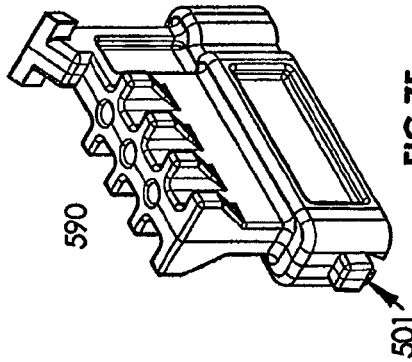


FIG 7F

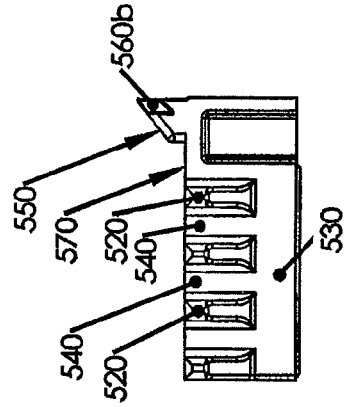


FIG 7D

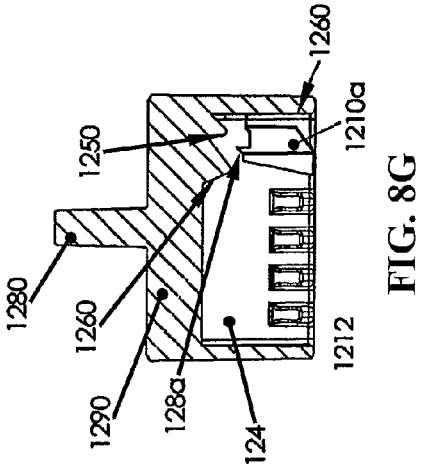


FIG. 8G

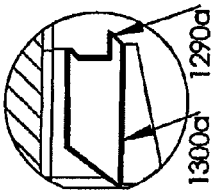


FIG. 8D

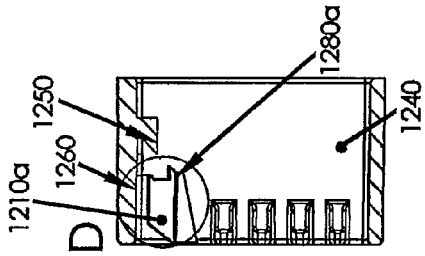
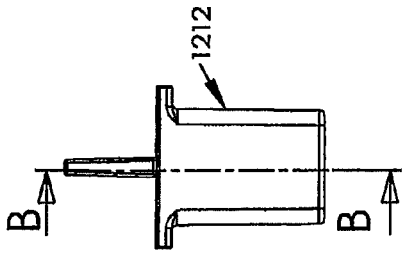


FIG. 8C



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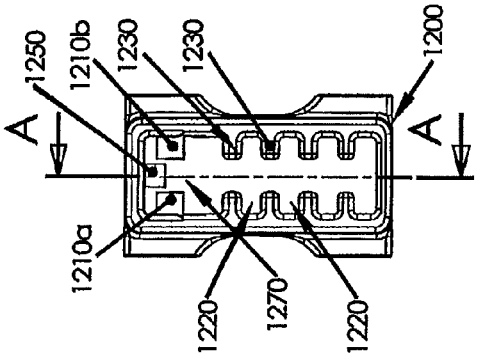


FIG. 8B

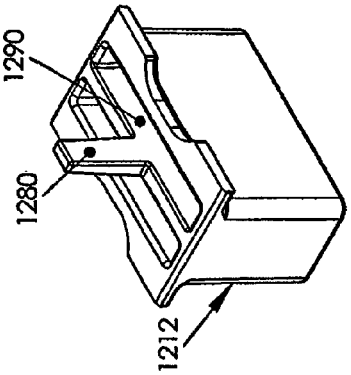


FIG. 8E

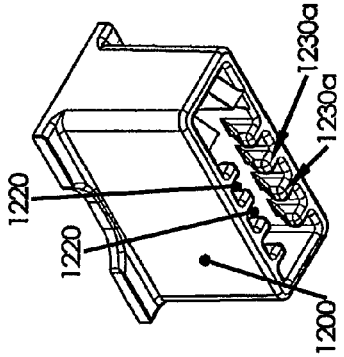
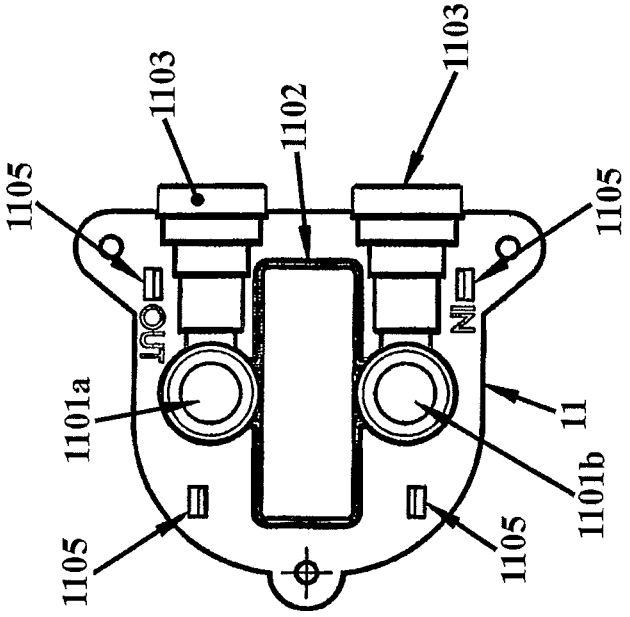


FIG. 8A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OUT
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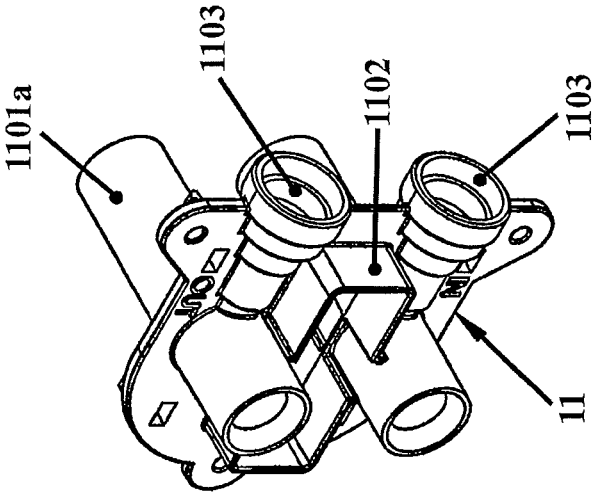
FIG. 9B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IN
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FIG. 9A

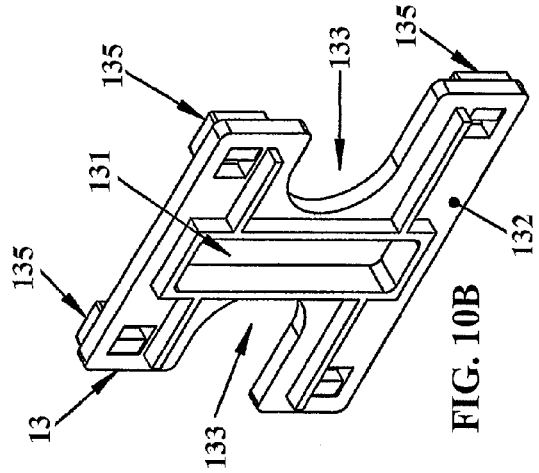

FIG. 10B

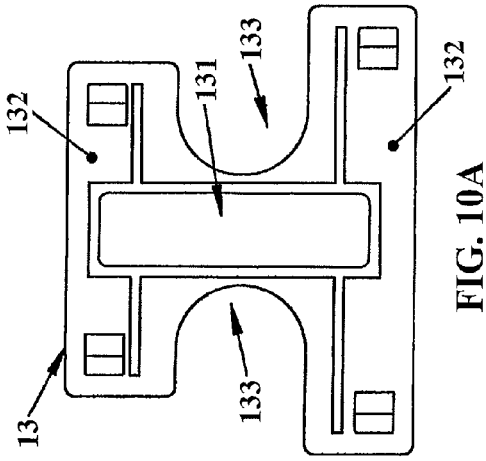

FIG. 10A

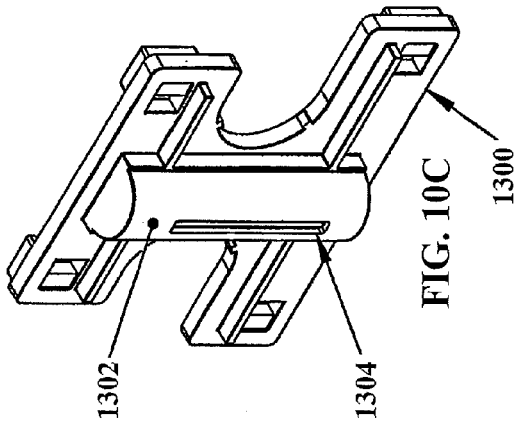

FIG. 10C

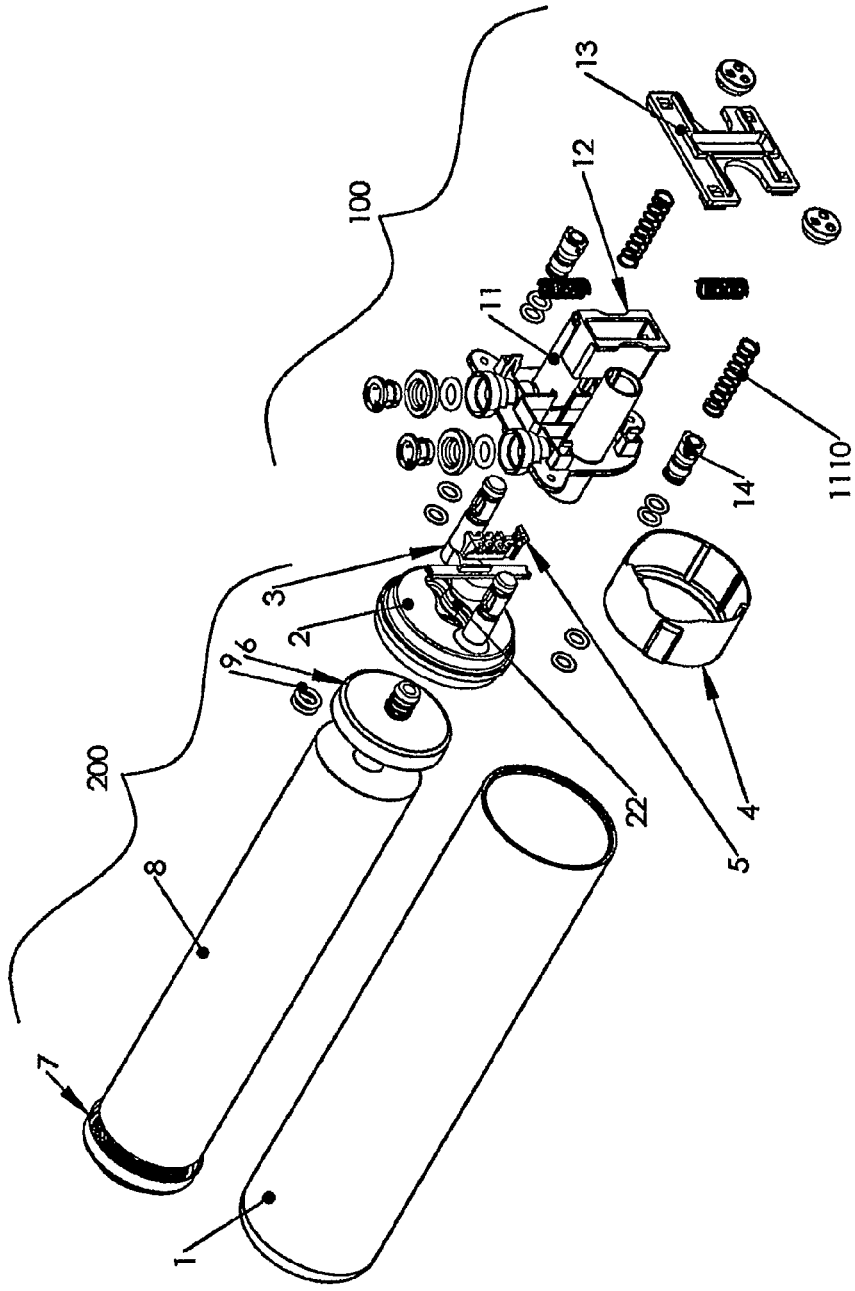

FIG. 11

PUSH FILTER WITH FLOATING KEY LOCK

This invention relates to a filtering apparatus, specifically a filter housing apparatus to facilitate easy removal and replacement of a filter housing from a mechanical support, and more specifically, to a push filter design that activates a floating key lock, where the key may be used simultaneously as a lock and as an identifier for particular filter attributes. The mechanical support may be situated inline, and in fluid communication, with influent and effluent piping, such as within a refrigerator. More specifically, the invention relates to a filter housing and mount, whereby the filter housing may be attached to, and removed from, the mount by a push-actuated release. A controlled attachment or detachment of the filter sump, containing the filter media, is activated by the axial push of the sump towards the mechanical support. The specific key lock design allows a user to identify and match certain filter configurations received by the mechanical support, and reject other filter configurations. An internal shutoff, activated by the push-actuated release, blocks spillage during filter housing removal and replacement.

BACKGROUND OF THE INVENTION

The invention relates to a water filtration system having a locking and unlocking mechanism for changing the filter when the filter media has served its useful life. The use of liquid filtration devices is well known in the art as shown in U.S. Pat. Nos. 5,135,645, 5,914,037 and 6,632,355. Although these patents show filters for water filtration, the filters are difficult to replace owing to their design and placement. For example, U.S. Pat. No. 5,135,645 discloses a filter cartridge as a plug-in cartridge with a series of switches to prevent the flow of water when the filter cartridge is removed for replacement. The filter must be manually inserted and removed and have a switch activated to activate valve mechanisms so as to prevent the flow of water when the filter is removed. The cover of the filter is placed in the sidewall of a refrigerator and is employed to activate the switches that activate the valves. The filter access is coplanar with the refrigerator wall and forces an awkward access to the filter cartridge.

In U.S. patent application Ser. No. 11/511,599 filed on Aug. 28, 2006, for Huda, entitled "FILTER HOUSING APPARATUS WITH ROTATING FILTER REPLACEMENT MECHANISM," a filter assembly having a rotator actuating mechanism including a first internal rotator and a second internal rotator is taught as an efficient way to insert, lock, and remove the filter housing from its base. A simple push mechanism actuates the self-driving release and change over means that hold and release the filter housing sump, and provide influent shutoff to prevent leaking and spillage. Rotational shutoff and locking mechanisms are activated and released by axial force on the filter housing at the commencement of the filter changing procedure.

The instant invention is particularly useful as the water filtering system for a refrigerator having water dispensing means and, optionally, an ice dispensing means. The water used in the refrigerator or water and ice may contain contaminants from municipal water sources or from underground well or aquifers. Accordingly, it is advantageous to provide a water filtration system to remove rust, sand, silt, dirt, sediment, heavy metals, microbiological contaminants, such as Giardia cysts, chlorine, pesticides, mercury, benzene, toluene, MTBE, Cadmium bacteria, viruses, and other know contaminants. Particularly useful water filter media for microbiological contaminants include those found in U.S. Pat. Nos. 6,872,311, 6,835,311, 6,797,167, 6,630,016, 6,331,037, and 5,147,722, and are incorporated herein by reference thereto. One of the uses of the instant filter apparatus is as a water filtration apparatus for a refrigerator. Refrigerators are appliances with an outer cabinet, a refrigeration compartment disposed within the outer cabinet and having a rear wall, a pair of opposing side walls, at least one door disposed opposite the rear wall, a top and a bottom and a freezer compartment disposed in the outer cabinet and adjacent to the refrigeration compartment. It is common for refrigerators to have a water dispenser disposed in the door and in fluid communication with a source of water and a filter for filtering the water. Further, it is common for refrigerators to have an ice dispenser in the door and be in fluid communication with a source of water and a filter for filtering the water. It has been found that the filter assembly of the instant invention is useful as a filter for a refrigerator having a water dispenser and/or an ice dispenser.

SUMMARY OF THE INVENTION

The present invention is directed to, in a first aspect, a filter housing assembly comprising: a filter housing for enclosing a filter media, the filter housing having a body and a top portion for forming a fluid-tight seal with the body, the filter housing top portion including: an ingress port; an egress port; an elongated protrusion extending from a top surface of the filter housing top portion; and a filter key located on the top portion and having a top surface, longitudinal sides, and lateral sides, the filter key including a plurality of spaced protrusions or fingers on each longitudinal side of the filter key extending laterally from the top surface, wherein the fingers include winged extensions having slanted or angled faces for mating attachment to a filter base or manifold, the filter key having a groove complementary to the elongated protrusion for insertably securing the filter key to the filter housing top portion by slidably mating the elongated protrusion of the filter housing top portion within the filter key groove.

The fingers on the filter key may have a diamond shaped cross-section.

The filter key may be attached to the filter housing top portion by snap fit, friction fit, welding, or bonding.

The filter housing top portion is attachable to a filter manifold or base, the filter manifold or base comprising an attachment structure for fixably receiving the spaced protrusions or fingers on the longitudinal sides of the filter key.

The ingress or egress ports may be integrally formed on the filter housing top portion. The ingress port and the egress port are off axial center of the filter housing. The filter housing top portion may be a one-piece construction or multiple components integrally attached and secured.

The spaced protrusions or fingers are integrally formed with the filter key.

The filter housing body may include at least one strengthening rib, which may also be used as a guide for correct alignment during insertion within the filter base.

The at least one strengthening rib preferably protrudes radially from the filter housing body and extends longitudinally intermediate between top and bottom portions of the filter housing.

The filter key may also include an indented angled ramp segment on at least one bottom edge, and the filter housing top portion includes at least one protruding angled ramp segment for complementary mating with the angled ramp segment on the filter key.

In a second aspect, the present invention is directed to a filter housing assembly comprising: a filter housing for enclosing a filter media; a filter head having two ports for

ingress and egress integral with the filter head and in fluid communication with the filter media, the filter head forming a fluid-tight seal with the filter housing and a first attachment structure located on the filter head for receiving a filter key; and the filter key having a top surface, a bottom, longitudinal sides, and lateral sides, the filter key including: a plurality of spaced protrusions or fingers on each longitudinal side of the filter key extending laterally from the top surface and having winged extensions; and a second attachment structure located on the filter key bottom for attaching the filter key to the first attachment structure on the filter manifold.

In a third aspect, the present invention is directed to a filter base for releasably connecting to a complementary mating filter housing assembly comprising: a base platform having fluid ingress and egress ports; and a floating lock in sliding communication with the base platform, having a bottom surface, a top surface, and longitudinal and lateral sides, the floating lock including: spaced protrusions, drive keys, or fingers on the longitudinal sides extending laterally inwards, including at least one shaped protrusion, finger, or drive key for slidably contacting the complementary mating filter housing assembly, the at least one shaped protrusion, finger, or drive key including an angled face exposed towards the bottom surface.

The floating lock may include a position stop centered about the lateral sides, and located above the at least one drive key to provide a physical stop during insertion of the complementary mating filter key. The filter key includes a track structure longitudinally across the floating lock. The filter base includes an enclosure for receiving the floating lock, the enclosure allowing the floating lock to slidably move therein.

In a fourth aspect, the present invention is directed to a filter base in combination with a filter housing assembly, the combination comprising: a filter base having an ingress port and an egress port on a base platform; a slidable floating lock in slidable contact of the filter base, the floating lock having a plurality of drive keys or lateral extensions separated by gaps; a resilient member in contact with the floating lock, providing a retraction force for the floating lock; a filter housing assembly including a top portion having a filter head with a top surface, a first attachment structure and an elongated protrusion extending from the filter head top surface, and at least one protruding angled ramp segment for complementary mating with the angled ramp segment on the filter key; and a filter key located on a top portion of the filter housing assembly, the filter key having longitudinal sides and lateral sides, the filter key including: a plurality of spaced protrusions or fingers on each longitudinal side of the filter key extending laterally from the top surface, wherein the fingers include winged extensions having slanted or angled faces for mating attachment to a filter base or manifold; a second attachment structure having a groove complementary to the elongated protrusion for insertably securing the filter key to the filter head top surface by slidably mating the elongated protrusion of the filter head within the groove; and an indented angled ramp segment on at least one bottom edge.

The floating lock may include: a bottom surface, a top surface, and longitudinal and lateral sides, and wherein the lateral extensions include drive keys on the longitudinal sides extending laterally inwards at the bottom surface for slidably receiving the filter key, each of the drive keys including an angled portion exposed towards the bottom surface, and an edge or wedge on each of the drive key bottom for releasably contacting with a portion of the filter key; and a position key centered about the floating lock, and located above the drive keys to provide a physical stop during insertion of the filter housing assembly.

The filter head includes a top surface with a first attachment structure and an elongated protrusion extending from the filter head top surface, and the filter key includes a second attachment structure having a groove complementary to the elongated protrusion for insertably securing the filter key to the filter head top surface by slidably mating the elongated protrusion of the filter head within the groove.

It is an object of this invention to provide a filter housing apparatus mounted to a base and having an automatic locking mechanism for simple replacement and removal.

It is an object of this invention to provide a filter housing apparatus and base attached by a push activated, slideably moveable, floating lock.

It is another object of this invention to provide a filter housing apparatus mounted on a surface having non-rotating locking means with pressure activation for replacement and removal.

It is another object of the present invention to provide a filter housing apparatus that allows for a keyed identification of the filter.

It is a further object of this invention to provide a filter housing apparatus for use with water dispensing and\or ice dispensing apparatus whereby filtered water is provided to the water dispensing and/or ice dispensing apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

The features of the invention believed to be novel and the elements characteristic of the invention are set forth with particularity in the appended claims. The figures are for illustration purposes only and are not drawn to scale. The invention itself, however, both as to organization and method of operation, may best be understood by reference to the description of the preferred embodiment(s), which follows, taken in conjunction with the accompanying drawings in which:

FIG. **1**A is a top exploded view of one embodiment of the filter assembly of the present invention.

FIG. **1**B is a side plan view the embodiment of the filter housing assembly of FIG. **1**A.

FIG. **1**C depicts a perspective view of the filter housing assembly with strengthening ribs extending at least partially down the outer surface of the filter housing.

FIG. **2**A is a perspective view of one embodiment of the filter key of the present invention.

FIG. **2**B is a lateral side view of the filter key of FIG. **2**A.

FIG. **2**C depicts a bottom plan view of the filter key of FIG. **2**A showing a groove and a locking nub or tab for attachments.

FIG. **2**D depicts a perspective view from the opposite side of the filter key of FIG. **2**C.

FIG. **2**E depicts a bottom view of the filter key of FIG. **2**A.

FIG. **2**F is a longitudinal side view of the filter key of FIG. **2**A.

FIG. **2**G depicts a slotted groove which includes a wider upper portion for securely affixing the filter key to the filter head or filter manifold.

FIG. **2**H is a side view of the filter key depicting an angled, ramp segment, which at least partially extends the length of the bottom surface of the filter key.

FIG. **2**I depicts the complementary angled ramp segment for the filter key of FIG. **2**H.

FIG. **2**J depicts a side view of a partial section of the filter head showing a mating protrusion for interlocking with the slotted groove on the filter key, and complementary angled ramp segments for interlocking with the ramp segments on the filter key bottom edges.

FIG. **3**A depicts a perspective view of one embodiment of the floating lock or sliding lock of the present invention.

FIG. **3**B is a perspective view from the opposite side of the floating lock of FIG. **3**A.

FIG. **3**C is a lateral side view of the floating lock of FIG. **3**A.

FIG. **3**D depicts a top view of the floating lock of FIG. **3**A.

FIG. **3**E depicts cross-sectional longitudinal side view of the floating lock of FIG. **3**A.

FIG. **4**A is a perspective view of one embodiment of the filter manifold.

FIG. **4**B is a top plan view of a second embodiment of the filter manifold with an extension support member.

FIG. **4**C is a perspective view of a second embodiment of the filter manifold.

FIG. **5**A is a side view of one embodiment of the filter head of the present invention.

FIG. **5**B is a bottom perspective view of the filter head of FIG. **5**A.

FIG. **5**C is a top perspective view of the filter head of FIG. **5**A.

FIG. **5**D is another embodiment of the filter head with a snap fit lock for the filter key.

FIG. **5**E is a bottom perspective view of the filter head of FIG. **5**D.

FIG. **5**F is a top perspective view of the filter head depicting the aperture for receiving the filter key.

FIG. **5**G depicts a one-piece or integrated filter head/filter manifold construction having ingress and egress ports for fluid flow.

FIG. **5**H is a side view of the integrated, one-piece filter head of FIG. **5**G.

FIG. **5**I is a bottom view of the integrated, one-piece filter head of FIG. **5**G, depicting an off axial center cylinder for receiving an end cap port of the filter cartridge.

FIGS. **6**A and **6**B are exploded views of a second embodiment of the filter assembly of the present invention, showing a filter key having an extended boss.

FIG. **7**A is a top perspective view of an embodiment of the filter key of the present invention having an extended boss.

FIG. **7**B is a bottom perspective view of the filter key of FIG. **7**A.

FIG. **7**C depicts a top plan view of the filter key of FIG. **7**A.

FIG. **7**D depicts a side plan view of the filter key of FIG. **7**A.

FIG. **7**E depicts an end or lateral side view of the embodiment of the filter key of FIG. **7**A, showing the boss rising above the plane created by the fingers, and two wings extending laterally outwards from the boss.

FIG. **7**F is a perspective view of another embodiment of the filter key of the present invention showing a locking nub located on the bottom portion on a lateral side.

FIG. **8**A depicts a perspective view of an embodiment of the floating lock of the present invention.

FIG. **8**B is a top view of the floating lock of FIG. **8**A.

FIG. **8**C is a cross-sectional view of the floating lock of FIG. **8**A depicting a drive key located at one end of the floating lock on the longitudinal or side panel.

FIG. **8**D depicts an exploded view of the drive key of FIG. **8**C showing the edge angle and face.

FIG. **8**E depicts a perspective view of a floating lock having an extension member.

FIG. **8**F is a side view of the floating lock of FIG. **8**E having an extension member.

FIG. **8**G is a lateral or cross-sectional view of the floating lock of FIG. **8**E with an extension member.

FIG. **9**A is a perspective view of a non-floating port of the present invention.

FIG. **9**B is a top plan view of the non-floating port of FIG. **9**A.

FIG. **10**A is a top plan view of one embodiment of the rear plate of the present invention.

FIG. **10**B is a bottom perspective view of the rear plate of FIG. **10**A.

FIG. **10**C is a top plan view of a second embodiment of the rear plate of the present invention.

FIG. **11** is an exploded view of a filter assembly of the present invention, showing a filter key having a boss, connected to a filter manifold having extension supports.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

In describing the preferred embodiment of the present invention, reference will be made herein to FIGS. **1** to **11** of the drawings in which like numerals refer to like features of the invention. Features of the invention are not necessarily shown to scale.

The present invention is directed to a filter housing assembly for filtration of liquids, including the interception of chemical, particulate, and/or microbiological contaminants. The use of the mechanical locking assembly of the filter housing without the need for excess force and tight tolerances essential in prior art filter housings makes for easy and frequent filter changes and optimal filter performance. The filter housing assembly of the present invention provides simplified filter changes to minimize process downtime and without recourse to tools. A simple push mechanism actuates the self-driving release and change over means that hold and release the filter housing sump or filter cartridge, and provides influent shutoff means to prevent leaking and spillage. A floating lock or sliding lock responsive to an axial insertion force from the filter cartridge moves perpendicular or radially to the axial motion of the sump, and allows a specific filter key to insert within the floating lock. Once inserted, the floating lock retracts towards its original position under a resilient force, such as two springs in tandem, or other complementary resilient mechanism keeping the floating lock under retraction tension when moved from its initial position. The filter key and floating lock combination allows for the identification of specific filter models and may be configured to reject all but specific filter types.

Removal of the filter cartridge is performed in the same manner. An axial insertion force causes the floating lock to move radially, which allows the filter key to be removed from the floating lock. An extraction force provided by spring tension, or the like, helps push the filter cartridge out of its base. Fluid shutoff and locking mechanisms are initiated by the axial force on the filter cartridge at the commencement of the filter changing procedure.

The present invention is described below in reference to its application in connection with, and operation of a water treatment system. However, it should be apparent to those having ordinary skill in the art that the invention may be applicable to any device having a need for filtering liquid.

FIG. **1**A is a top exploded view of the preferred embodiment of the filter assembly of the present invention. The filter assembly is fixably secured in a position within an operating environment requiring fluid filtration, such as attached to an internal sidewall of a refrigerator, although certainly other operating environments may be envisioned, and the filter assembly may be used in any number of environments where the filter assembly has access to, and can be placed in fluid

communication with, influent and effluent fluid access ports. For illustrative purposes only, application to the filtering of water being piped into a refrigerator is discussed.

A filter housing assembly **200** comprises the removable, detachable filter cartridge or sump of the filter assembly from a filter base **100**. Filter housing assembly **200** includes a filter housing **1**, which encloses filter media **8**, a filter head **2** that attaches at one end to filter housing **1**, and attaches at the other end to a filter manifold **3** and non-floating port **11**. A filter key **5** is attached to filter manifold **3**. Filter base **100** includes non-floating port **11**, floating lock **12**, and rear plate **13**. Filter head **2** secures in a water-tight fit to filter housing **1**. The attachment scheme may be made by a water-tight screw fit, bond, weld, or other water-tight fastening mechanism commonly used in the art for sealing adjoining components, typically adjoining plastic components. As discussed in further detail below, filter key **5** is connected to filter manifold **3**. Filter key **5** may be formed as one piece with filter manifold **3**, or may be securely attached by other methods, such as bonding, welding, press fit, friction fit, or the like. Filter key **5** may also be removably attached for replacement by an end user. Filter manifold **3** is attached to filter head **2**. Filter media **8** is located in filter housing **1**. Each end of filter media **8** is secured by a cap that facilitates the direction of the fluid being treated by the filter. At one end, filter media **8** is secured by a closed end cap **7**, and at the other end by open end cap **6**. Filter media **8** may be any filter media known in the art, and preferably, is a carbon block filter. It is typically shaped in a similar fashion as filter housing **1**, which in the preferred embodiment is cylindrical. Open end cap **6** is designed to interface and be in fluid communication with filter head **2**.

In another embodiment, filter housing **1** may include strengthening ribs **16** longitudinally located on the filter housing outer surface. FIG. **1**C depicts a perspective view of filter housing assembly **200** with a row of strengthening ribs extending at least partially down the outer surface of filter housing **1**. Strengthening ribs **16** also function as a guide for inserting filter housing assembly **200** into a shroud (not shown) that may be part of the installation assembly for ensuring proper alignment with filter base **100**. Strengthening ribs **16** is preferably integral with filter housing **1**, but may also be attachable as a separate component part. Ribs **16** may extend the full length of filter housing **1**, or as shown, may extend to an intermediate point between filter housing assembly **200** end caps **6**, **7**.

Filter housing assembly **200** is a finished assembly including filter housing **1**, which encompasses filter media **8** by closed end cap **7** at one end, and open end cap **6** at the other. Generally, o-ring seals, such as o-ring seal **9**, are used to prevent water leakage where different components are expected to mate. Filter manifold **3** and filter key **5** are joined with filter head **2**, and secured to filter housing **1** to form the assembled filter housing apparatus **200**. These components may be integral, permanently secured, or removably attached to one another, and to filter head **2**. FIG. **1**B is a side plan view of the preferred embodiment of the filter assembly of the present invention.

FIG. **2**A is a perspective view of filter key **5**. FIG. **2**B is a lateral side view of filter key **5**. As previously noted, the bottom of filter key **5** is attached to filter manifold **3** by any number of fastening schemes, or may be integrally formed with filter manifold **3**. FIG. **2**C depicts a groove **51** that is preferably shaped to receive a complementary protrusion on filter manifold **3**, and is preferably shaped to receive a dovetail protrusion; however, other connecting, complementary shapes are not excluded. For example, FIG. **2**G depicts a slotted groove **51***b* that is not a dovetail joint. Slotted groove **51***b* may include a wider upper portion **51***c* to more securely affix filter key **5** to filter manifold **3**. The connection of filter key **5** with filter manifold **3** may be bonded, sonic welded, press fitted, friction fitted, or the like. As depicted in the illustrative embodiment, groove **51** is shaped to accept a snap feature for a press or snap fit located on filter manifold **3**. In this manner filter key **5** may be removably attached to filter manifold **3**. Similarly, filter manifold **3** may be designed to be removably attached to filter head **2**. Thus, the design has more flexibility to introduce and accommodate different key configurations, which can be used to designate specific filter types, and purposely reject other filter types. Additionally, filter key **5** may include an angled, ramp segment **59***a* on at least its bottom edges where filter key **5** slidably mates with the top surface of filter manifold **3** or filter head **400**. FIG. **2**H is a side view of filter key **5** depicting angled ramp segment **59***a*, which at least partially extends the length of the bottom surface of filter key **5**. Angled ramp **59***a* is located at one end of the bottom edges of filter key **5** and extends into the filter key main body **5***a*. FIG. **2**I depicts a perspective view of filter head **400** with complementary angled ramp segments **59***b* for mating with angled ramp segments **59***a* of filter key **5**. Angled ramp segment **59***a* matably adjoins complementary angled ramp segment **59***b* to interlock and assist in securing filter key **5** to filter head **400**. For the two piece design utilizing filter manifold **3**, complementary angled ramp segments **59***b* are formed on the top surface of filter manifold **3**. FIG. **2**J depicts a side view of a partial section of filter head **400** showing mating protrusion **321** for interlocking with slotted groove **51***b*, and complementary angled ramp segments **59***b*.

FIG. **4**A depicts a perspective view of the one embodiment of filter manifold **300**. Port **310** is shown off center of filter manifold **300**. FIG. **4**A depicts the filter manifold without extension support members. Preferably, port **310** is an outlet port; however, the present invention is not limited to a specific ingress and egress location, and may have these ports interchanged. When port **310** is used as an egress or outlet port, filter manifold **300** takes fluid from filter media **8** through the center port of open cap **6**, and directs fluid flow radially outwards from the axial center to port **310**. In this embodiment, the ingress port is located on filter head **2**. By locating the ingress and egress ports off axis, filter housing assembly **200** has a more robust design, with enhanced structural integrity for mounting to the filter base, and for remaining fixably in place during attachment. Referring to FIGS. **4**A-**4**C, in a preferred attachment scheme for filter key **5**, a protrusion **32** or **320** is formed on or near the center line of filter manifold **3** or **300**. Protrusion **32** or **320** is preferably a rectangular shaped segment extending above circular center portion **33** or **330**. Protrusion **32** allows for precise alignment of filter key **5**, while providing a robust connection. A dovetail shape, press fit, or friction fit interconnection between protrusion **32** and groove **51** of filter key **5** permits the user to remove and replace filter key **5**. This allows for the designation of specific filter keys, and correspondingly, specific filter cartridges. Protrusion **32** or **320** may be integrally formed with filter manifold **3** or **300**, respectively, or may be separately fabricated and attached by bond, weld, press fit, friction fit, or other suitable means known in the art. Preferably, protrusion **32** or **320** has a dovetail shaped surface for mating with complementary groove **51** of filter key **5**.

In the embodiment depicted by FIGS. **4**B and **4**C, protrusion **32** may be on an extension support **34**. FIG. **4**B depicts a top level view of filter manifold **3**, showing extension support **34** extending longitudinally or radially outward from center portion **33**, along a radius. Extension support **34** supports optional shroud **4** that covers and protects filter head **2**.

Filter manifold **3** or **300** seats within, and attaches to, filter head **2**. FIG. **5**A depicts a side view of one embodiment of filter head **2**. Filter head **2** is shown with off-center port **21**. In this manner, port **21** of filter head **2** and port **31** of filter manifold **3** are both off-center and parallel to one another about a plane that approximately intersects the center point of filter head **2**. As shown in FIGS. **1**, **4**, and **5**, a recessed portion **22** formed about the center point of filter head **2** receives center portion **33** of filter manifold **3**. If extension support **34** is used with filter manifold **3**, when filter manifold **3** is inserted within filter head **2**, extension support **34** is situated approximately perpendicular to the plane formed by ports **21** and **31**. Extension support **34** provides at each end a snap fit design for shroud **4**. FIG. **5**B is a bottom perspective view of the filter head. FIG. **5**C is a top perspective view of filter head **2** depicting recess portion **22**.

Filter head **210** depicts another embodiment as shown in FIGS. **5**D-**5**F. In this embodiment, as depicted in the top perspective view of FIG. **5**F, on the top surface of filter head **210** is a curved receiving boss or support member **230** located on one side of the center point, and two parallel, lateral support members **240***a,b* located opposite curved boss **230** on the other side of the center point of filter head **210**. These structural support members are used to align filter key **5** to filter head **210**, and help secure filter key **5**. This filter head may be used in conjunction with the filter manifold **300** without extension supports, as depicted in FIG. **4**A. Structural support member **230** provides a physical stop for filter key **5**, which typically slides on protrusion **32** provided by filter manifold **300**. Lateral support members **240***a,b* are used to align filter key **5**, and prevent it from inadvertent shifting. FIG. **5**E is a bottom perspective view of filter head **210**. FIG. **5**D is a side view of filter head **210**.

In another embodiment, filter head **2**, **210** may be integral with filter manifold **3**, **310**, such as for example, a one piece construction in the form of a single injected molded piece, or a two piece construction with filter manifold **3**, **310** welded, fused, or otherwise permanently attached to filter head **2**, **210** as a subassembly. FIG. **5**G depicts a one-piece or integrated filter head/filter manifold construction **400** having ingress and egress ports **410***a,b*. Protrusion **420** is preferably a shaped segment extending above, and off axis from, the circular center of filter head **400**. Protrusion **420** allows for precise alignment of filter key **5**, while providing a robust connection. A dovetail shape, press fit, or friction fit interconnection between protrusion **420** and groove **51** of filter key **5** permits the user to remove and replace filter key **5**. FIG. **5**H is a side view of integrated, one-piece filter head **400**. Cylindrical wall **424** is sized to receive the open end cap **6** of filter housing **1**. Cylindrical wall **426** is off the axial center of filter head **400** and is configured to receive the center axial port of end cap **6**, redirecting fluid flow off the axial center such that port **410***b* is within cylinder **426**, and port **410***a* is outside of cylinder **426**. This redirection of fluid flow performs a similar function as filter manifold **3**, **310** without the need of aligning the center axial port of end cap **6** with a filter manifold aperture. FIG. **5**I is a bottom view of the integrated, one-piece filter head of FIG. **5**G, depicting off axial center cylinder **426** for receiving a port of open end cap **6** of the filter cartridge. A comparison to FIGS. **5**B and **5**E which depict perspective views of the underside of filter head **2**, **210** respectively, with FIG. **5**I, demonstrates the absence of an axially centered cylinder for receiving the port from open end cap **6** in the integrated filter head **400** design.

Filter manifold **300** includes an off-center port **310**, as well as a center portion **330** that fits securely within recess **220** of filter head **210**. Protrusion **320** receives the groove from filter key **5**. In this embodiment, when filter key **5** is slidably inserted within protrusion **320**, structural support member **230** and lateral structural support members **240***a,b* secure filter key **5**. The curved portion of structural support member **230** forces filter key **5** to be inserted in one direction only. An added boss **232**, located on the top of filter head **210** and centered between lateral support members **240***a,b* may be employed to serve as a lock or snap fit for filter key **5**. Additionally, in another embodiment, structural support member **230** may be formed with a small aperture **235** located directly away from the center point of filter head **210** at its base where support member **230** meets the top portion of filter head **210**. This small aperture **235** is designed to receive a protruding material or locking nub or tab **53** placed at, or formed with, the corresponding end portion of filter key **5** on the lower end of a lateral side. Locking nub or tab **53** on filter key **5** is inserted within small aperture **235** on the curved portion of structural support member **230** and prevents axial removal of filter key **5** away from filter head **210**. FIGS. **2**A-**2**F show locking nub **53** located on the bottom portion of a lateral side of filter key **5**. FIG. **5**D is a side view of filter head **210** depicting aperture **235** for receiving filter key **5**.

Filter key **5** includes at least one laterally extending finger **52**, and preferably a plurality of extending fingers, as depicted in FIGS. **2**A-**2**F. FIG. **2**C is a bottom perspective view of filter key **5**. In a first illustrative embodiment, filter key **5** is shown with ten laterally extending fingers **52**. Fingers **52** are preferably constructed of the same material as, and integrally formed with, base **55** of filter key **5**. However, the fingers may also be removably attached, and the filter key design is not limited to an integrally formed construction. The laterally extending fingers **52** may form a number of different configurations. In the illustrative embodiment, there is a uniform gap **54** between each finger **52**. In other configurations, a finger may be missing on one or both sides of filter key **5**, and gap **54** may be wider in some places than in others. Using a digital 1, 0 designations to indicate a finger (1) or a gap (0), it is possible to have many different configurations for a filter key. The configuration as shown in FIG. **2**E would be designated on each side as 101010101. As a separate example, for a designation of 100010101, this would represent a lateral finger (1) followed by a wide gap (000), and then a finger (1) followed by a gap (0) and a finger (1) followed by another gap (0), and one last finger (1). The present invention is not limited to any particular finger/gap order. Additionally, it is not necessary for the finger/gap configuration on one side of filter key **5** to be symmetric with the finger/gap configuration on the opposite side. By having different finger/gap configurations, it is possible to make a mechanical key identifier for the specific filter housing assembly being employed. Filter key **5** may also be color-coded to facilitate identification for different filter cartridges or housing assemblies. It may also be textured, mirrored, transparent, translucent, materially modified, or having a conductively signature, or any combination thereof, for identification purposes. More importantly, aside from identification of the filter housing assembly, a particular filter key finger/gap configuration will only allow for the use of a specific filter housing assembly in a given system.

Fingers **52** of filter key **5** are strength bearing members, used to mate with, or interlock with, corresponding drive keys **123***a,b* located on longitudinal sides of floating lock **12** as depicted in FIG. **3**. There must be at least one drive key on floating lock **12** that corresponds to, and lines up with, at least one finger on filter key **5**, so that when filter key **5** is inserted to mate with floating lock **12**, the drive keys slidably contact the fingers and floating lock **12** is shifted longitudinally an incremental amount to allow fingers **52** on filter key **5** to

traverse between the gaps **122** on floating lock **12**. Once fingers **52** have passed between the corresponding gaps on floating lock **12**, which is slidably restrained under tensional forces, floating lock **12** is partially returned towards its original position by the tensional retraction forces so that at least one finger on filter key **5** aligns or interlocks with at least one drive key on floating lock **12**, and the alignment resists any direct outward, axial extraction forces.

Each finger **52** of filter key **5** includes a slanted face **58** as depicted in FIGS. **2**A and **2**F. These angled features are made to slidably contact complementary slanted edge or angled features **121***a,b* of drive keys **123***a,b* of floating lock **12** shown in FIGS. **3**A and **3**E. During insertion of filter key **5**, the sliding contact of the angled feature of the filter key's fingers transversely shifts floating lock **12** off of its initial position, and allows the fingers of filter key **5** to be inserted within gaps **122** between the drive keys **123***a,b*.

A perspective view of floating lock **12** is depicted in FIGS. **3**A and **3**B. Floating lock **12** has angled-faced fingers, protrusions, or drive keys **123***a,b* and gaps **122** that may reciprocally correspond to fingers **52** and gaps **54** located on filter key **5**. It is not necessary for the drive key/gap configuration of floating lock **12** to be exactly complementary to the finger/gap configuration of filter key **5**. It is only necessary that floating lock **12** is able to fully receive the inserting filter key **5** when filter housing assembly **200** is axially inserted into filter base **100**. Each drive key **123***a,b* of floating lock **12** is shaped with a receiving wedge **129***a,b*, respectively, opposite slanted edge **121***a,b* to capture fingers **52** of filter key **5**. Fingers **52** may have a cross-sectional diamond shape to facilitate the capture by the drive key receiving wedge **129***a,b*. Drive keys **123***a,b* are placed on at least one longitudinal side of floating lock **12**, as depicted in FIGS. **3**D and **3**E. Underneath and centered between drive keys **123***a,b* is a row of position stops **125**. Position stops **125** preclude fingers **52** from extending any further during insertion. There need not be a position stop **125** for each drive key **123***a,b*, provided there is at least one position stop **125** to prohibit over insertion of filter key **5**. Position stops **125** also include a slanted or angled face **126** for slidable contact with slanted face **58** of fingers **52** on filter key **5**. Position stops **125** are shown as a row of jagged edges, but do not have to correspond one-for-one with drive keys **123***a,b*.

Upon insertion, when fingers **52** of filter key **5** contact drive keys **123***a,b*, floating lock **12** shifts away from its initial position, against retraction forces, and moves according to the contacting angled edges **58** and **121**. Once wings **56***a,b* of fingers **52** clear lip **127***a,b* of drive keys **123***a,b*, floating lock **12** is not prohibited from reacting to the retraction forces, and moves slightly back, towards its original position where diamond shaped wings **56***a,b* are then trapped by receiving wedges **129***a,b*. This position locks filter key **5** to floating lock **12** resisting any a direct axial extraction force.

There is a gap or space **124** between the bottom most portion of drive key **123***a,b* and top most portion of position stop **125**. Upon extraction, when wings **56***a,b* of fingers **52** are pushed within this gap or space, there is no structure preventing floating lock **12** from responding to the tensional retraction forces acting on it. Thus, floating lock **12** is free to respond to the retraction forces, and will tend to move towards its initial position. This will align fingers **52** of filter key **5** within gaps **122** of floating lock **12** and allow for easy extraction of filter housing **200**.

In order to extract filter housing assembly **200**, a user again pushes axially inwards on the filter housing assembly, which releases wings **56***a,b* on filter key **5** from drive keys **123***a,b*. This frees floating lock **12** to return to towards its original position, and locates fingers **52** on filter key **5** at gaps **122** of floating lock **12**. Filter housing assembly **200** can now be freely extracted from filter base **100**. Resilient members **1110** within shut-off stanchions **1101***a,b* of non-floating port **11** assist in pushing or extracting filter housing assembly **200** away from filter base **100**.

FIG. **9**A is a perspective view of non-floating port **11**, which works in tandem with rear plate **13** or rear plate **1300** to hold floating or sliding lock **12** in place while allowing it to freely move longitudinally off its center position and back to its center position during the insertion and extraction of filter housing assembly **200**. As discussed further herein, non-floating port **11** will also hold floating lock **1200** and floating lock **1212** of FIG. **8**. For simplicity, reference is made chiefly to the interaction of non-floating port **11** with floating lock **12**, although the applicability of non-floating port **11** includes usage with floating lock **1200** and **1212** as well. Non-floating port **11** includes a protruding encasement **1102**, larger than floating lock **12**, and made to enclose floating lock **12** therein. Encasement **1102** prevents over-travel of floating lock **12**, and protects it when installed from extraneous, unintended movement. FIG. **9**B is a top plan view of non-floating port **11**. Stanchions **1101***a,b* are located on opposite sides of encasement **1102**. Ports **1103** represent the ingress and egress ports for the fluid. Shut-off stanchions **1101***a,b* include shutoff plugs **14**, which act as valve seals to stop fluid flow when the filter cartridge is being removed. Shut-off stanchions **1101***a,b* are preferably cylindrical in shape, containing spring activated, o-ring sealed plugs for sealing the ingress and egress lines during filter cartridge removal. In a preferred embodiment, rear plate **13** is snap fitted into non-floating port **11**. In order to accommodate this, snap fittings **1105** are shown on non-floating port **11** that receive a corresponding fitting **135** on rear plate **13**.

Referring to FIG. **1**, floating lock **12** is supported by non-floating port **11** and rear plate **13**. FIG. **10**A is a top plan view of one embodiment of rear plate **13** of the present invention. FIG. **10**B depicts a bottom perspective view of rear plate **13**. Rear plate **13** secures floating lock **12** within a support structure in non-floating port **11**. Rear plate **13** is preferably attached by snap fit to non-floating port **11**, although other attachment schemes known in the art may be easily employed, such as bonding, welding, and assorted mechanical fasteners. Rear plate **13** is formed with extensions **132** on each end, and shaped gaps **133** therebetween. Gaps **133** are shaped to go around shut-off stanchions **1101***a,b* of non-floating port **11**. In this embodiment, rear plate **13** includes a center aperture **131** that allows for longitudinal movement of floating lock **12**. Floating lock **12** may include an extension member opposite the face configured with fingers and gaps, in order to permit resilient components, such as helical or torsion springs to act upon it. FIGS. **3**C and **3**E are side views of the floating lock showing extension member **128**. FIG. **3**B is a perspective view of the floating lock **12** with extension member **128**. FIG. **8**E depicts floating lock **1212** with extension member **1280**. In these embodiments, the extension member is acted upon by resilient devices held by the rear plate.

FIG. **10**C is a top plan view of another embodiment of the rear plate **1300** of the present invention. In this embodiment, the topside of rear plate **1300** includes a domed, slotted cover **1302** over the center aperture. Cover **1302** is formed to encase springs or other resilient members about the extension member **128** extending from floating lock **12**. Dome **1302** includes a slot **1304** that is made to receive the extension member **128** from floating lock **12**. Slot **1304** helps retain linear movement of floating lock **12** inside dome **1302**. In this embodiment, two

complementary resilient members, such as springs, would reside on each side of the extension member **128** of floating lock **12**. One resilient member preferably applies force on the floating lock extension member in one direction, while the other resilient member applies force to the floating lock extension member in the opposite direction. In this manner, no matter which way floating lock **12** is moved or shifted, a retraction force presents itself to return floating lock **12** to its original, centered position.

At all times during insertion, the filter housing assembly is under extraction forces that tend to push the housing out of the filter base. These extraction forces result from resilient members in each shut-off stanchion **1101***a,b* of non-floating port **11** (shown in FIG. **9**B) that force shutoff plugs **14** into position in order to block the ingress and egress ports. Preferably, the extraction forces on shutoff plugs **14** are provided by a spring **1110** in each port, although other resilient members may be used to provide a similar result. Inserting the filter housing assembly into the filter base works against these extraction forces, and pushes shutoff plugs **14** further up each shut-off stanchion **1101***a,b* of non-floating port **11**. This allows for fluid ingress, while keeping the filter housing assembly under the constant extraction force.

Protective port shroud **4** may be placed over filter head **2**, to protect the floating lock **12** and filter key **5** mechanism from damage and debris. Shroud **4** is preferably supported by the extension supports on the filter manifold.

FIGS. **6**A and **6**B are exploded views of another embodiment of the filter assembly of the present invention, showing the combination of filter manifold **300**, filter key **500**, and filter head **210**. Filter key **500** is depicted without a locking nub or tab; however it may include a locking nub to facilitate attachment to the filter head. FIG. **7**F depicts filter key **590** with locking nub or tab **501**. Locking nub **501** is located at the base of filter key **590**. In this embodiment, filter key **500** or **590** and filter manifold **300** are modified such that floating lock **1200** or **1212** of FIG. **8** is slidably shifted by the interaction wings **560***a,b* of an extended boss **550** on filter key **500** or **590** with drive keys **1210***a,b* of floating lock **1200**.

Filter key **500** or **590** is inserted within floating lock **1200** through the axial insertion of the filter housing assembly into the filter base. Hammerhead shaped wings **560***a,b* on fingers **520** of filter key **500** and drive keys **1210***a,b* on floating lock **1200** or **1212** slidably contact one another, causing a transverse motion of floating lock **1200** or **1212** perpendicular to the axial motion of insertion. In this manner, floating lock **1200** or **1212** is shifted longitudinally, in a direction radially relative to the filter housing assembly axis. Fingers **520** of filter key **500** are positioned within the gaps **1220** on floating lock **1200** or **1212**. Once filter key **500** or **590** is inserted, floating lock **1200** or **1212** is returned partially towards its original position by retracting tensional forces, preferably by complementary spring forces, so that the fingers on floating lock **1200** or **1212** align directly with fingers **520** on filter key **500** or **590**, thus preventing a direct extraction force from removing the filter housing assembly from the filter base.

FIG. **7**F depicts a top perspective view of filter key **590**. At one end of filter key **590** is an upwardly extended angled boss **550**. Boss **550** rises above horizontal plane **570** created by the top portion of fingers **520**, and is angled toward fingers **520**, with its highest point at one end of filter key **500**. Boss **550** angles downward from its highest point towards fingers **520**. Preferably, boss **550** is an upwardly facing triangular or wedge shaped design having wings **560***a,b* for interaction with drive keys **1210***a,b*, respectively, on floating lock **1200**. FIG. **7**E depicts an end view of filter key **500** showing a hammerhead shaped boss **550** rising above plane **570** created by fingers **520**, and wings **560***a,b* extending laterally from boss **550** resembling what may be considered a hammerhead shape. The purpose of wings **560***a,b* is to contact corresponding angled drive keys **1210***a,b* on floating key **1200**.

A perspective view of the complementary floating lock **1200** is depicted in FIG. **8**A. The only difference between floating lock **1200** of FIG. **8**A and floating lock **1212** of FIG. **8**E is the addition of an extension member **1280** on floating lock **1212**. Floating lock **1200** has fingers **1230***a,b* and gaps **1220** that may reciprocally correspond to fingers **520** and gaps **540** located on filter key **500** or **590**. It is not necessary for the finger/gap configuration of floating lock **1200** to be exactly complementary to the finger/gap configuration of filter key **500** or **590**. It is only necessary that floating lock **1200** is able to fully receive the inserting filter key **500** when the filter housing assembly is axially inserted into the filter base. Furthermore, once floating lock **1200** is subjected to retraction forces acting to return it partially towards its original position, it is necessary that at least one finger on filter key **500** or **590** vertically align with at least one finger on floating lock **1200** or **1212** preventing any extraction without further shifting of floating lock **1200** or **1212**.

Using floating lock **1200** and filter key **500** as illustrative examples, upon slidable contact of wings **560***a,b* on filter key **500** and drive keys **1210***a,b* on floating lock **1200**, floating lock **1200** moves in a transverse motion, perpendicular to the axial motion of insertion. In this manner, floating lock **1200** is shifted longitudinally, in a direction radially relative to the filter housing assembly axis. Fingers **520** of filter key **500** are positioned within the gaps **1220** on floating lock **1200**. Once filter key **500** is inserted, floating lock **1200** is returned partially towards its original position by retracting tensional forces, preferably by complementary spring forces, so that the fingers on floating lock **1200** align directly with fingers **520** on filter key **500**, thus preventing a direct extraction force from removing the filter housing assembly from the filter base.

Fingers **1230***a,b* are preferably constructed of the same material as floating lock **1200** and integrally formed therewith. However, fingers **1230** may also be removably attached, and the floating lock design is not limited to an integrally formed construction. Additionally, the present invention is not limited to any particular finger/gap order. It is not necessary for the finger/gap configuration on one side of floating lock **1200** to be symmetric with the finger/gap configuration on the opposite side. Floating lock **1200** is responsive to tensional forces, such as complementary springs acting on it from two separate directions to provide resistance longitudinally. Floating lock **1200** effectively moves longitudinally when acted upon by filter key **500**, and is forced to return partially towards its original position after fingers **520** of filter key **500** have traversed through gaps **1220**. Upon partial retraction, fingers **520** are aligned behind or underneath fingers **1230** of floating lock **1200**. FIG. **8**B is a top view of floating lock **1200** showing laterally extending fingers **1230***a,b* and adjacent gaps **1220** between the fingers.

FIG. **8**C is a cross-sectional view of floating lock **1200**, depicting drive key **1210***a*, which is located at one end of floating lock **1200** on longitudinal or side panel **1240**. Drive key **1210***a* is opposite a similar drive key **1210***b* (not shown), which is located on the opposite longitudinal panel of floating lock **1200**. Both drive keys are designed to have an angled face for slidably interacting with wings **560***a,b* of boss **550** on filter key **500**. Each drive key is preferably integrally fabricated with floating lock **1200**; however, the drive keys may be fabricated separately and attached to the longitudinal panels of floating lock **1200** by attachment means known in the art.

As shown in FIG. **8**C, below drive key **1210***a* is a position key or physical stop **1250**, preferably formed with the supporting lateral wall **1260** of floating lock **1200**. As shown in FIG. **8**B, position key **1250** is situated between drive keys **1210***a,b*. Position key **1250** may be integrally formed with lateral wall **1260**, or may be separately attached thereto by any acceptable means in the prior art, such as bonding, welding, gluing, press fitting, and the like. Position key **1250** acts as a physical stop to ensure against over travel of floating lock **1200**. Position key **1250** is situated below drive keys **1210***a,b* by a distance designed to accommodate the insertion of boss **550** of filter key **500**. Upon insertion of filter key **500** into floating lock **1200**, boss **550** traverses through gap **1270** in floating lock **1200** formed by the space between drive keys **1210***a,b*. Wings **560***a,b* of boss **550** extend outward relative to the width of boss **550**, traversing between lateral wall **1260** and drive keys **1210***a,b*. In this manner, wings **560***a,b* retain floating lock **1200** from retracting back to its original position while boss **550** is being inserted. At all times, floating lock **1200** is under the retraction force of resilient members, such as tandem springs, or the like, tending to keep floating lock **1200** its original position, which is preferably a centered position. During insertion of filter key **500**, wings **560***a,b* interact with drive keys **1210***a,b* to shift floating lock **1200** longitudinally off-center while under the resilient retraction forces. Upon full insertion, when boss **550** reaches and contacts position key **1250**, wings **560***a,b* are no longer held by drive keys **1210***a,b* because the length of drive keys **1210***a,b* is shorter than the length of boss **550**. At this point in the insertion process, the tensional retraction forces shift floating lock **1200** towards its original position.

Once wings **560***a,b* reach position key **1250**, and the user releases the insertion force initially applied on the filter housing assembly, the extraction forces from shutoff plug springs **1110** dominate. These forces push the filter housing assembly axially outwards, away from floating lock **1200**. Since wings **560***a,b* are no longer bound between drive keys **1210***a,b* and lateral wall **1260**, floating lock **1200** will tend to shift longitudinally, partially towards its original position as filter key **500** moves slightly axially outwards. At this point, wings **560***a,b* interact with edge angles **1280***a,b* to push away from the center position, shifting filter key **500**, and combining or contacting with face **1300***a,b* to keep the filter housing from retracting. FIG. **8**D depicts an exploded view of drive key **1210***a* with edge angle **1290***a* and face **1300***a*.

Fingers **520** of filter key **500** are now aligned with fingers **1230** of floating lock **1200** and remain in contact in a vertical plane in the axial direction, prohibiting extraction of the filter housing assembly from the filter base.

It is envisioned that the preferred embodiment of the present invention would be disposed in a refrigerator, most likely within the door. The output of the filter assembly may be selectively coupled to a water dispenser or an ice dispenser. The water source to the refrigerator would be in fluid communication with filter base **100**, and prohibited from flowing when filter housing assembly **200** is removed from filter base **100**. Shutoff plugs **14** in stanchions **1101***a,b* seal fluid flow until filter housing assembly **200** is inserted in filter base **100**. Upon insertion, fluid would flow to the filter housing assembly and filter water would be returned from the filter housing assembly.

All parts of the filter housing assembly **200** and filter base **100** may be made using molded plastic parts according to processes known in the art. The filter media may be made from known filter materials such as carbon, activated carbons, malodorous carbon, porous ceramics and the like. The filter media, which may be employed in the filter housing of the instant invention, includes a wide variety of filter media capable of removing one or more harmful contaminants from water entering the filter housing apparatus. Representative of the filter media employable in the filter housing include those found in U.S. Pat. Nos. 6,872,311, 6,835,311, 6,797,167, 6,630,016, 6,331,037, and 5,147,722. In addition, the filter composition disclosed in the following Published Applications may be employed as the filter media: US 2005/0051487 and US 2005/00111827.

The filter assembly is preferably mounted on a surface in proximity to a source of water. The mounting means are also preferably in close proximity to the use of the filtered water produced by the filter housing apparatus.

While the present invention has been particularly described, in conjunction with a specific preferred embodiment, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art in light of the foregoing description. It is therefore contemplated that the appended claims will embrace any such alternatives, modifications and variations as falling within the true scope and spirit of the present invention.

The invention claimed is:

1. A filter housing assembly comprising:

a filter housing for enclosing a filter media, said filter housing having a body and a top portion for forming a fluid-tight seal with said body, said filter housing top portion including:

an ingress port;

an egress port;

an elongated protrusion extending from a top surface of said filter housing top portion; and

a filter key located on said top portion and having a top surface, longitudinal sides, and lateral sides, said filter key including a plurality of spaced protrusions or fingers on each longitudinal side of said filter key extending laterally from said top surface, wherein said fingers include winged extensions having slanted or angled faces for mating attachment to a filter base or manifold, said filter key having a groove complementary to said elongated protrusion for insertably securing said filter key to said filter housing top portion by slidably mating said elongated protrusion of said filter housing top portion within said filter key groove.

2. The filter housing assembly of claim **1** wherein said fingers include a diamond shaped cross-section.

3. The filter housing assembly of claim **1** including having said filter key attached to said filter housing top portion by snap fit, friction fit, welding, or bonding.

4. The filter housing assembly of claim **1** including a filter manifold or base attached to said filter housing top portion, said filter manifold or base comprising an attachment structure for fixably receiving said spaced protrusions or fingers on said longitudinal sides of said filter key.

5. The filter housing assembly of claim **4** wherein said ingress or egress ports are integrally formed on said filter housing top portion.

6. The filter housing assembly of claim **5** wherein said ingress port and said egress port are off axial center of said filter housing.

7. The filter housing assembly of claim **1** wherein said spaced protrusions or fingers are integrally formed with said filter key.

8. The filter housing assembly of claim **1** including at least one strengthening rib on said filter housing body.

9. The filter housing assembly of claim **8** wherein said at least one strengthening rib protrudes radially from said filter

housing body and extends longitudinally intermediate between top and bottom portions of said filter housing.

10. The filter housing assembly of claim **1** wherein said filter key includes an indented angled ramp segment on at least one bottom edge, and said filter housing top portion includes at least one protruding or extended angled ramp segment for complementary mating with said indented angled ramp segment on said filter key.

11. The filter housing assembly of claim **1** wherein said filter key includes an extended, protruding angled ramp segment on at least one bottom edge, and said filter housing top portion includes at least one indented angled ramp segment for complementary mating with said protruding angled ramp segment on said filter key.

12. A filter housing assembly comprising:

a filter housing for enclosing a filter media;

a filter head having two ports for ingress and egress integral with said filter head and in fluid communication with said filter media, said filter head forming a fluid-tight seal with said filter housing and a first attachment structure located on said filter head for receiving a filter key; and

said filter key having a top surface, a bottom, longitudinal sides, and lateral sides, said filter key including:

a plurality of spaced protrusions or fingers on each longitudinal side of said filter key extending laterally from said top surface and having winged extensions; and

a second attachment structure located on said filter key bottom for attaching said filter key to said first attachment structure on said filter manifold.

13. The filter housing assembly of claim **12** wherein said filter key is fixably or removably attached to said filter head.

14. The filter housing assembly of claim **12** wherein said filter key fingers include slanted or angled faces on said winged extensions.

15. The filter housing assembly of claim **14** wherein said winged extensions have a diamond shaped cross-section.

16. A filter base for releasably connecting to a complementary mating filter housing assembly comprising:

a base platform having fluid ingress and egress ports; and

a floating lock in sliding communication with said base platform, having a bottom surface, a top surface, and longitudinal and lateral sides, said floating lock including:

spaced protrusions, drive keys, or fingers on said longitudinal sides extending laterally inwards, including at least one shaped protrusion, finger, or drive key for slidably contacting said complementary mating filter housing assembly, said at least one shaped protrusion, finger, or drive key including an angled face exposed towards the bottom surface.

17. The filter base of claim **16** wherein said floating lock includes a position stop centered about said lateral sides, and located above said at least one drive key to provide a physical stop during insertion of said complementary mating filter key.

18. The filter base of claim **17** wherein said key includes a track structure longitudinally across said floating lock.

19. The filter base of claim **16** including an enclosure for receiving said floating lock, said enclosure allowing said floating lock to slidably move therein.

20. A filter base in combination with a filter housing assembly, said combination comprising:

a filter base having an ingress port and an egress port on a base platform;

a slidable floating lock in slidable contact of said filter base, said floating lock having a plurality of drive keys or lateral extensions separated by gaps;

a resilient member in contact with said floating lock, providing a retraction force for said floating lock;

a filter housing assembly including a top portion having a filter head with a top surface, a first attachment structure and an elongated protrusion extending from said filter head top surface, and at least one protruding angled ramp segment for complementary mating with said angled ramp segment on said filter key; and

a filter key located on a top portion of said filter housing assembly, said filter key having longitudinal sides and lateral sides, said filter key including:

a plurality of spaced protrusions or fingers on each longitudinal side of said filter key extending laterally from said top surface, wherein said fingers include winged extensions having slanted or angled faces for mating attachment to a filter base or manifold;

a second attachment structure having a groove complementary to said elongated protrusion for insertably securing said filter key to said filter head top surface by slidably mating said elongated protrusion of said filter head within said groove; and

an indented angled ramp segment on at least one bottom edge.

21. The combination of claim **20** wherein said floating lock includes:

a bottom surface, a top surface, and longitudinal and lateral sides, and wherein said lateral extensions include drive keys on said longitudinal sides extending laterally inwards at said bottom surface for slidably receiving said filter key, each of said drive keys including an angled portion exposed towards said bottom surface, and an edge or wedge on each of said drive key bottom for releasably contacting with a portion of said filter key; and

a position key centered about said floating lock, and located above said drive keys to provide a physical stop during insertion of said filter housing assembly.

22. The combination of claim **20** wherein said filter head includes a top surface with a first attachment structure and an elongated protrusion extending from said filter head top surface, and said filter key includes a second attachment structure having a groove complementary to the elongated protrusion for insertably securing said filter key to said filter head top surface by slidably mating the elongated protrusion of said filter head within said groove.

23. The filter housing assembly of claim **20** wherein said filter housing assembly top portion includes at least one extended angled ramp segment for complementary mating with said indented angled ramp segment on said filter key.

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